IBM SNA
System Network Architecture

■ PROFILE

Architecture • Systems Network Architecture (SNA) distributed architecture • evolution includes SNA 1 (1974), SNA 2 (1975), SNA 3 (1976), SNA 4.1 (1979), and SNA 4.2 (1981); SNA 1, SNA 2, and SNA 3/4.1/4.2 comprise 3 groups that cannot coexist with one another on same network.

Network Configuration Summary • includes host computers, local and remote communication controllers, network controllers, distributed processors, terminal cluster controllers, terminals, general/office systems, and integral/detached modems • some systems, such as 8100 and 4300, can operate as Local Area Network (LAN) processors for connecting to specific equipment • S/38 can function in peer-to-peer relationship with host system as a SNA Physical Unit (PU) 2.1 and SNA Logical Unit (LU) 6.2.

Host Systems • includes all S/370-compatible systems: 4300, 303X, and 308X Series • operate as network nodes • 4361 supports integrated communications adapter; all other models require front-end communications controller • 4361 can also support front-end communications controller.

Communications Controllers • 3705-II, 3705-80, and 3725 communications controllers operate as local or remote front-end processors • 3705-II supports up to 352 half-duplex lines operating at data rates up to 230.4K bps; can be shared by up to 4 hosts concurrently • 3705-80 supports up to 16 half-duplex lines operating at data rates up to 56K bps; can be shared by up to 2 hosts concurrently • 3725 supports up to 80 (Model 2), 256 (Model 1) half-/full-duplex lines operating at data rates up to 256K bps; can be connected to up to 4 to 8 hosts but shared by up to 2 to 6 hosts concurrently • number of front-end processors per host virtually unlimited • 3710 Network Controller can multiply up to 31 downstream lines into 1 or more upstream lines; supports up to 32 lines total.

Distributed Processors • IBM 4361, 8100, Series/1, System/36, /38, Personal Computers, and 5280 Distributed Data Systems • 3800 and 6700 are distributed printing subsystems.

Cluster Controllers • IBM 3270, 3600, 3630, 3650, 3730, 3790, 4700, and 8100 system controllers; also 3710 Network Controller.

Terminals • IBM 3101 Display Terminal, 3270 display-printer family, 3770 batch-printer family, 8775 display terminal, and all terminals or computers that can emulate IBM 3270 or RJE protocol, such as IBM Personal Computers, Series/1, System/36/38.

General & Office Systems • small systems available for varied applications: IBM Personal Computers, System 23 Datamaster, 5280 Distributed Data System, 5520 Administrative System, and Series/1, System/36, or /38, 4300, and 8100 computer systems.

Network Management/Control • 3705/3725 front-end processor running under ACF/NCP/VS manages messages • SSCP (System Service Control Program) running under TCAM or VTAM (includes VTAME) in host manages network resources and distributed systems • VTAM or TCAM supplies NCP with bind information for sessions across the network; MSNF in ACF/VTAM or ACF/TCAM supports communication across domain boundaries • ACF/VTAM and ACF/NCP provide gateway to allow interconnection of up to 255 independent SNA networks • user supplies network parameters to SSCP • network manager controls network through NCCF (Network Communication Control Facility) through operator station using NPDA (Network Problem Determination Applications), OCCF (Operator Communication Control Facility), Information/Management, and advanced function modems • reporting facilities on status provided in all SNA products • SNA supporting subsystems for specific control facilities include CICS/VS, IMS/VS, TSO, and NJE • SNA terminals and distributed systems that control local environment include 3270, 3710, 4300, and 8100 • data systems that connect to SNA network and handle local processing include Series/1 RPS/CM and EDX/CF, Systems/36 SSP and ICF, and System/38 CPF • Network Performance Monitor (NPM) provides realtime monitoring of network and displays present network status.

Multisystem Network Management • through MSNF (Multisystem Networking Facility) running under ACF/VTAM or ACF (TCAM): incorporated in ACF/VTAME and later versions of ACF/TCAM and ACF/VTAM allows any terminal to access any application across multiple hosts within network • MSC (Multiple Systems Coupling) Feature of IMS provides facilities to route messages from one IMS/VS system to transactions and terminals in the domain of other IMS/VS host systems • ISC (Intersystems Communications) Facility for CICS (similar to MSC for IMS) through ACF/TCAM or ACF/VTAM(E) allows a transaction running on one host sytstem to access files and DL/1 databases, initiate transactions, queue messages, and communicate directly with a transaction running on another CICS/VS host system.

Distributed Processing Management • provides session, job, and transaction control for interlinking host site complexes with each other (multisystem networking), interconnecting host processors at a host site (system interconnection), and linking central and remote sites for managing flow of information.

Session-Level Networking Control Products • include ACF/VTAM, ACF/TCAM, ACF/VTAME, MSNF (Multisystem Networking Facility) running under ACF/VTAM or ACF/TCAM but incorporated in ACF/VTAM, at central host sites and SSP/ICF (Interactive Communication Feature) at System/36 site • VM/VCNA allows VM/CMS systems to be full participants in SNA network.

Job-level Networking Control Products • include JES (Job Entry System) and NJE (Network Job Entry) for JES2 for MVS/370 and MVS/XA host sites; JES3 under MVS/370 and MVS/XA host sites; RSCS (Remote Spooling Communications Subsystem) Networking for VM/370 host sites; JEP (Job Entry Program) and FTP (File Transport Program) for DOS/VSE with VSE/POWER host sites; SRJE/MRJE (Single/Multileaved Remote Job Entry) on System/36; RJEF (Remote Job Entry Facility) on System/38 and RJE or MRJE on Series/1.

Transaction Processing Networking Control Products • includes IMS-MSC (Information Management System—Multiple Systems Coupling) or CICS-ISC (Customer Information Control System—Intersystem Communications Control) at host site.

Applications Development • IBM supplies many pre-written programs for cross-industry and industry-specific applications as well as many hardware/software products to support both an information center with tools, packages, techniques, and assistance for non-EDP end users and a development center for EDP staff • Information Center products include interactive subsystems, end-user-oriented languages, and interactive applications packages • Development Center products include data systems, application generators, and interactive program development facilities.

Cross Industry & Industry-Specific Application Products • text processing/word processing, data entry, remote job entry, billing, inventory control, accounts receivable, sales analysis/general ledger, accounts payable, payroll, query/report writing, business graphics, CAD/CAM, plant automation, production planning, retail/point of sale, transportation/utilities, public sector, and insurance packages.

End-User-Oriented Languages • VS APL available under TSO, VM/CMS, and CICS/VS on host system; DPPX APL on 8100;

©1984 Data Decisions

IBM SNA
System Network Architecture

IBM BASIC under VM/SP-CMS on host; VSBASIC under TSO, VM/CMS, and ICCF on host; BASIC and FORTRAN on S/36; VS FORTRAN under MVS/TSO and VM/CMS on host; FORTRAN under TSO, VM/CMS, and ICCF on host and under DPPX on 8100; Pascal/VS under VM/CMS, TSO, MVS, on host; Pascal, FORTRAN, BASIC, and COBOL for IBM Personal Computer and Series/1.

Application Generators • IMSADFII (Information Management System Application Development Facility) for database/data communication systems • Cross System Generators include: DMS/CSP (Data Management System/Cross System Product) an interactive interface for defining, testing, maintaining, and generating application programs to execute with SSX/VSE, CICS/VS, TSO, or VM/CMS on host and with DPPX or DPCX on 8100; SDF (Screen Definition Facility)/CICS available for SSX/VSE, DOS/VSE, and OS/VS for online definition and editing of maps and map sets; ELIAS (Entry Level Interactive Application System) an interactive program to assist designers and programmers implementing DP/DC applications; BRADS (Business Report Application Development System) is general-purpose report-writing, inquiry, and data management product for System/23, 34, and 36; DIF (Display Information Facility) and IDU (Interactive Data Base Utilities) for application development on System/38.

Data Systems • provide database, data communication, and data administration facilities; see those paragraphs.

Interactive Program Development • products support terminal-oriented application development for Development Center and Information Center • include CMS (Conversational Monitor System) component of VM/370, TSO (Time Sharing Option) and TSO/E (Extensions) under MVS/370 and MVS/XA, ICCF (Interactive Communication Control Facility) under DOS/VSE, System/36 under SPP, System/38 under CPF with IDU (Interactive Data Base Utilities), 8100 under DPPX Command Facility with and without extension, and Series/1 under RPS or EDX • ISPF (Interactive System Productivity Facility) manages dialog services in MVS/TSO and VM/CMS environments to IBM 3270 terminal users; ISPF/PDF (Program Development Facility) provides editing services to DP and non-DP professionals.

Systems Management • includes all the facilities for problem management, change management, processing management, performance management, audit/security management, capacity management, and management reporting available under SSX/VSE, DOS/VSE, MVS, and VM/370 running on host systems as well as on other systems that can connect to SNA networks; these include programs that run on S/36, S/38, and 8100 • Table 1 lists primary products to provide systems management.

TABLE 1: PRIMARY PRODUCTS FOR SYSTEMS MANAGEMENT

	Operating Environment		
System/370, 30XX, 4300	**DOS/VSE**	**MVS**	**VM/370**
Problem Management			
Account Network Management Program (ANMP)	•	•	
Environment Recording and Evaluation Program (EREP)	•	•	•
Display Exception Monitoring Facility (DEMF)		•	
Generalized Trace Facility (GTF)		•	
Interactive Problem Control System (IPCS)	•	•	•
Information/VM-VSE	•		•
Information/MVS		•	
Information/Management		•	
Information/Access		•	
Network Problem Determination Application (NPDA)	•	•	
Network Logical Data Manager (NLDM)		•	
Subsystem Information Retrieval Facility (SYSINFOREF)		•	
System Error Management Facility (SEMF)	•	•	
System Exception Report (SER)		•	
VTAM Network Control Application (VNCA)		•	
Change Management			
Account Network Management Program (ANMP)	•	•	
Maintain System History Program (MSHP)	•		
Information/VM-VSE	•		•
Information/MVS		•	
Information/Management		•	
Information/Access		•	
Systems Modification Program (SMP)		•	
Teleprocessing Network Simulator (TPNS)		•	

 ©1984 Data Decisions

IBM SNA
System Network Architecture

TABLE 1: PRIMARY PRODUCTS FOR SYSTEMS MANAGEMENT (CONT'D)

	Operating Environment		
System/370, 30XX, 4300	**DOS/VSE**	**MVS**	**VM/370**
Processing Management			
Distributed Systems Executive (DSX)	•	•	
File Transfer Program (FTP)	•	•	
Host Command Facility (HCF) for 8100 DPPX or DPCX	•	•	
Job Entry Program (JEP)	•	•	
Network Communications Control Facility (NCCF)	•	•	
Operations Planning and Control (OPC)		•	
Operator Communications and Control Facility (OCCF)	•	•	
VSE/Interactive Computing and Control Facility (VSE/ICCF)	•		
Performance Management			
CICS Performance Analysis Reporting System (CICSPARS)	•	•	
Generalized Performance Analysis Reporting (GPAR)		•	
IMS/VS Performance Analysis Reporting System (IMSPARS)		•	
Network Performance Analyser-3705 (NPA-3705)		•	
Network Performance Analysis and Reporting System (NETPARS)		•	
Network Performance Monitor for MVS and MVS/XA		•	
Resource Measurement Facilities (RMF)		•	
Systems Management Facilities (SMF)		•	
VM/370 Monitor/Reporting Program (VMAP)			•
VM/370 Real Time Monitor (VM/RTM)			•
VSE Performance Tool (VSE/PT)	•		
VTAM Performance Analysis and Reporting System (VTAMPARSII)		•	
Audit/Security Management			
DB/DC Data Dictionary	•		
Programmed Cryptographic Facility		•	
Resource Access Control Facility (RACF)		•	
SYSLOG Display and Search Facility (SDSF)		•	
Systems Management Facility (SMF)		•	
Capacity Management			
Capacity Planning Extended (CPX)		•	
Teleprocessing Network Simulator (TPNS)		•	
Management Reporting			
Account Network Management Program (ANMP)	•	•	
Information/Management		•	
Service Level Reporting (SLR)		•	
General Systems/34/36/38	**S/36 SSP**	**S/38 CPF**	**S/1**
Problem Management			
Hardware/Software Error Capture	•	•	•
Hardware/Software Error Reporting	•	•	•
Trace and Dumps	•	•	•
History Logs	•	•	•
Change Management			
PTF Logs	•	•	•
TPNS on Host to Driver Systems	•	•	•

©1984 Data Decisions

IBM SNA
System Network Architecture

TABLE 1: PRIMARY PRODUCTS FOR SYSTEMS MANAGEMENT (CONT'D)

	Operating Environment		
General Systems/34/36/38	**S/36 SSP**	**S/38 CPF**	**S/1**
Processing Management			
Automatic Reponse to Halts	•		
Help Facilities	•	•	•
Performance Management			
System Measurement and Reporting Facilities	•	•	•
Audit/Security Management			
Integrated Control and Reporting	•	•	•

Database Management • IMS/VS-DB (Information Management System/Virtual System—Database) with IMS/VS-DC or CICS/OS/VS running on host under OS/VS1(MVS), or MVS/XA provides a complete database/data communication system • DL/1 (Data Language/1) running under DOS/VS on host processor provides database for batch or online transaction-oriented applications • SQL/DS (Structured Query Language/Data System) is a relational database management system for host DOS/VSE, SSX/VSE or VM/370 systems • S/38 CPF includes integral quasi-relational database; 8100 DTMS (Database and Transaction Management System) includes database management system • Database 2 (DB2) available in third quarter 1984, is a new relational database for MVS/370 and MVS/XA environments.

Gateways to Other Networks • X.25 packet-switching interface to wide range of foreign and domestic packet-switching data networks • Direct Multinetwork Link (DMNL) under CICS/OS/VS, CICS/DOS/VS, and IMS/VS and Direct S.W.I.F.T. Network Link (DSNL) link IBM host to the Society for Worldwide Interbank Financial Telecommunication, S.C. (S.W.I.F.T.) network.

Support of Foreign Terminals • AT&T 83B3 Line Control Type, Western Union 115A Line Control Type, CPT (Customer Provided Terminal), TWX Line Control Type, IBM World Trade Teletypewriter Terminals, others supported when they emulate SNA devices, such as IBM 3270 or are ASCII terminals like 3101.

Security • user establishes security policy and access control rules; user implements them with IBM products • primary IBM products include DB/DC Data Dictionary (Resource Access Control Facility) Programmed, RACF, Cryptographic Facility, operating systems, CICS, communications systems, interactive facilities database management systems, access methods and communication terminals.

Announced • 1973 (SNA 1); 1975 (SNA 2); 1976 (SNA 3); and 1979 (SNA 4.1 and 4.2) • continuous updating of major software products.

First Delivery • 1975 (SNA 1); 1976 (SNA 2); 1977 (SNA 3); 1979 (SNA 4.1); 1981 (SNA 4.2).

Systems Delivered • over 10,000 S/370-compatible host sites.

Comparable Systems • Digital Equipment DNA (Digital Network Architecture); Sperry DCA (Distributed Communications Architecture); Honeywell DSA (Distributed System Architecture); Burroughs BNA (Burroughs Network Architecture); NCR CNA (Communications Network Architecture); Hewlett-Packard DSN (Distributed System Network); and other systems based on OSI (Open Systems Interconnection) • for limited application areas Prime Computer PRIMENET, Tandem EXPAND, Data General XODIAC.

Vendor • IBM Corporation, Information Systems Group • National Accounts Division (NAD); 1133 Westchester Avenue, White Plains, NY 10604; 914-696-1900 • National Marketing Division (NMD); 4111 Northside Parkway, Atlanta, GA 30327; 404-238-2000.

■ ANALYSIS

IBM was the first computer vendor to offer a standard for connecting its products together within a data communications network. SNA was initially designed to simplify connecting IBM computers together in networks. It replaced a Tower of Babel that included many access methods developed for application programs, many communications protocols, no networking capability, poor reliability/availability/serviceability (RAS) features, and minimal front-end support for host computers. SNA has evolved over the years since 1974 to become a very different product than the one first announced.

SNA Version 1 (1974) provided strong network control through a single central host computer with no distributed processing facilities, provided TCAM and VTAM access methods in the host, increased the front-end processor role, introduced NCP/VS operating system for the 3705-I front end, provided SDLC as the only communications protocol, and improved RAS features.

SNA Revision 2 (1975) extended support to include BSC terminals and some start-stop (asynchronous) terminals. SDLC and BSC terminals could not share the same lines, but they could reside in the same network.

SNA Revision 3 (1976) provided true computer networking. It added ACF (Advanced Communications Function) to VTAM, TCAM, and NCP/VS to support multiple hosts and multiple data centers through Multiple System Networking Facility (MSNF), increased the network role for the 3705 front-end, provided network job entry, and offered network control capabilities. Network job entry allowed a user to enter a batch job for execution on any applications processor. The user could specify where the job was to execute and where the output was to be presented. Network control capabilities included the Communication Management Configuration (CMC) facility, which defined terminals as in the domain of one or more CMC hosts. The CMC host ran dedicated applications for network control, including network definition, diagnostics, and reconfiguration.

SNA Versions 4.1 and 4.2 were announced in 1979. Differences between the two reflect different versions of the operating systems implementing the SNA functions. **SNA 4.2** offers alternate routing and multiple logical transmission groups, and three priorities for transmission. Both support the 3683/4/5 intelligent modems that can perform diagnostic routines on command from the 3705 front end.

SNA 4.2 also allows a terminal in one host's domain to exchange messages with a terminal in another host's domain.

SNA Revisions in 1983 allow SNA Netowrk Interconnection (SNI) of up to 255 networks through gateway NCP which requires a gateway SSCP in host system. Two logical units (LUs) in 2 different networks can be logically connected through gateway without redefining subarea addresses. A gateway SSCP can use any number of gateway NCPs to interconnect SNA networks. One NCP gateway can have up to 8 SSCP owners and each can be a gateway SSCP.

 ©1984 Data Decisions

IBM SNA
System Network Architecture

SNA Revisions in 1984 support 31-bit addressing of MVS/XA systems, introduction of the IBM 3710 netowrk Controller, and 3725 enhancements. The IBM 3710 Network Controller is supported as an SNA device that can multiplex up to 31 downstream lines into 1 or more upstream lines. IBM enhanced the 3725 communication controller: expanding Model 2 to 2M bytes of memory, 80 lines, and 4 channel adapters and supporting 1.544M-lps line on IBM 3726 communication expansion for Model 1. The MVS/XA systems support 31-bit addressing. This year, IBM extended SNA support of 31-bit addressing.

In 1974, the environment was dominated by centralized data processing facilities; distributed data processing was limited to a few intelligent terminals and minicomputers. The trend since then has been toward more and more distributed processing with the pace quickening each year.

IBM touted the introduction of the 8100 (1978) as being as significant as its announcement of the S/360 15 years earlier. It proclaimed the 8100 to be the vehicle for distributing processing within SNA networks. Even though its local loop control facilities and ease of use features were impressive, observers wondered why it was incompatible with IBM's host processors and why it had so little power.

It required the 4300 Series announcement (1979) to convince the computer community that IBM was serious about distributed processing. The 4300 price made IBM mainframes competitive with minicomputers. The 4300 is compatible with large IBM hosts; thus it functions amicably and economically in networks with large IBM hosts. A 4300 distributed system can also share control and cooperate with large hosts in transaction processing applications.

Despite the common 4300 Series label, the 4331 and 4341 were 2 totally different systems. Architecturally, the 4331 is a bus-centered system similar to minicomputer architectures while the 4341 is channel-oriented similar to S/370 and its compatible successors. Both can run the DOS/VSE, small operating system, but the 4341 could run the large system operating systems, OS/MVS and VM/370.

IBM continued to widen the gap between the 2 systems by adding the even smaller 4321 system with the preconfigured SSX/VSE operating software and larger 4341 models. The introduction of the 4361 and 4381 systems closed the gap between the 4331 and 4341 and between the 4300 and 308X mainframe computers.

In 1984, IBM announced the 3083C entry-level system, the 4381-3, and the 4361-3. The 4381-3 overlaps the 3083C in performance and the 4361-3 essentially replaced the 4321 and the remaining models of the 4331 line. Currently, the 4300 line consist only of the 4361 and 4381 Series. The 4361 Series continues with the integrated communications adapter so the system does not require a 3705/3725 communications controller to attach communication lines.

Experts wondered why IBM based the small operating system for the 4300 Series on DOS rather than OS. DOS/VSE can run on larger systems, but upgrading a DOS installation to an OS installation is not a trivial task. Perhaps the overriding reason for selecting DOS was its size. It is smaller than OS and requires less overhead, making it more appropriate for smaller systems. The penalty IBM pays, however, is that it perpetuates DOS as an active operating system making parallel development efforts for both DOS and OS necessary.

Recently, IBM has been doing parallel development for VM in native mode. Initially, VM was developed as an umbrella operating system to control multiple OS environments; it did not run in native mode. Then the Conversational Monitor System (CMS) was developed to run in native VM mode. In 1984, IBM began introducing communication programs as well as support for IBM Personal Computers in native VM mode. The most important VM communication product is ACF/VTAM 3.0, which allows VM to control an SNA network in native mode. In its statement of direction, IBM indicated the company intends to continue enhancements to ACF/VTAM under VM.

The 4300 Series has been extremely popular; over 30,000 had been installed worldwide. The 8100 Series, on the other hand, did not sell initially. It came out in August 1979, and it is estimated that 20,000 have been installed as of September 1984. Most early installations were DPCX systems, which operate as IBM 3790 replacements. General-purpose DPPX systems have been installed in substantial numbers since 1982.

The DPPX software was well received, but it was designed in modular fashion similar to OS for the S/370-compatible processors. The overhead was so high the 8100 had little of its precious power left to perform data processing.

IBM has since introduced the 8140C, a dual-processor version of the 8140B, and the 8150B dyadic processor to increase performance to about 0.4 (8140C) and 1.0 (8150B) MIPS as compared with 0.4 for 4361-3 and 1.5 MIPS for the 4361-5. The 4381, on the other hand, offers performance in the 0.6 to 4.8-MIPS range.

The 8100 initially had limited connectivity capabilities with other small IBM computer systems. IBM has increased its connectivity to IBM Datamaster, Series/1, 5280 Distributed Data System, the 3640 Plant Communication System, and IBM Personal Computer.

Another problem associated with the 8100 is that it runs under 2 operating systems not compatible with one another. Some programs run under DPPX and not under DPCX, and the converse. The Distributed Office Support Facility (DOSF) runs under DPCX, and DPPX users require a second 8100 system running DPCX to gain text processing facilities. The Distributed Office Support System (DISOSS), electronic mail facility, operates as a cooperative venture between an 8100 DPCX system and an IBM S/370-compatible host. Database, transaction processing, and program development software run only under DPPX.

IBM's direction with the 8100 has been to bring the facilities of DPPX and DPCX closer together. Both now support the 3270 Data Stream Compatibility (DSC) feature so that terminals connected to any 8100 can operate as if they were directly connected to a S/370-compatible host. The interconnect facilities with Series/1, Datamaster, and others as mentioned earlier are offered for both DPPX and DPCX systems. IBM has stated offer intentions to DOS under DPPX.

In the past year, however, IBM has introduced many software packages for System/36. The S/36 can function as an SNA LU 6.2 like System/38. In addition, IBM PCs can attach to S/36 for resource sharing and document distribution. The System/36 is small and inexpensive with an entry-level price of about $13K. Its performance is about 0.3 MIPS.

The System/38 is the upgrade system for System/36, although the upgrade is not an easy one. The performance range of System/38 is from about 0.2 MIPS to 1.2 MIPS. IBM has also increased its connectivity to other IBM systems in the past year.

It appears that the Systems/36 and /38 may very well displace the 8100 as the favored SNA distributed processing systems.

IBM is also moving out in many other directions. Changes are more rapid now than at any other time in its long history. The top of the line is expanding rapidly, but so are the bottom and the middle. IBM is also expanding into other communication-oriented ventures. It has gone outside to Intel to acquire the microcomputer for its Datamaster and Personal Computer. And it has acquired Rolm for PBX development using Rolm's CBX family. Satellite Business Systems, Inc (SBS), founded by IBM, Aetna, and Comsat, has launched more satellites, one from space by the Columbia crew on November 11, 1982. Comsat is pulling out, and if approved, IBM will increase its holding in SBS.

The IBM 3725, the long-predicted replacement for the 3705 Communications Processor, has been out for over a year now. It is evolutionary rather than revolutionary. It includes a separate maintenance and operating support system processor and is not software compatible with 3705. For a time, IBM matched software developments for 3705 for those for 3725. IBM announced recently that ACF/NCP 3.0 was the last release for the 3705. This means that future SNA developments will be implemented only on the 3725.

Hardware changes are rapidly being made, but so are software changes. The brisk business for replacement front ends to IBM mainframes has all but disappeared. Only Comten with its NCP-compatible software, keeps up with the changes IBM is making

 ©1984 Data Decisions

IBM SNA
System Network Architecture

to NCP. The Amdahl 4705, which runs IBM's NCP software, is selling well.

Mainframe announcements have added power at the top. The 10-MIPS 3081D model, introduced in November 1980, was topped by the 14-MIPS 3081K in October 1981. Furthermore, a 3081D can be field upgraded to a 3081K in just 14 hours.

In March 1982, IBM announced the 3083 Series of models which essentially replaced all the 3033 models. The performance of the 3083 models ranges from 3.0 MIPS to 8.4 MIPS.

The 3084, announced in September 1982, is a dual-processor version of the 3081K and rated at 26.6 MIPS. In addition, processors are periodically being offered with slightly more performance at the same price. The 3084 model now supports 96M bytes of real memory.

The newer mainframe models extend addressing from 24 to 31 bits for virtual and real addressing of 16M to 2048M bytes of memory. The XA version of the MVS operating system handles both 24- and 31-bit addressing concurrently. SNA now supports 31-bit addressing.

IBM has also introduced new Series/1 and System/38 models. System/36 has replaced the aging System/34. The company is supporting field-developed programs on 8100, adding new software and new models to its personal computer, and encouraging outsiders to develop programs for its personal computer.

Over the past year, IBM has announced 3 local area network products: the PC Cluster for interconnecting PCs for resource sharing, the PC Network based on the Sytek broadband LocalNet 40, and the IBM Cabling System with hints of token ring LAN to use it. The IBM Cabling System is being offered to provide a common cabling scheme to interconnect IBM terminals, PCs, and small computers.

The phenomenal success of the IBM PC in the past 2 years has been a big IBM story. As of December, IBM will have sold over 3.5 million of its PCs.

IBM introduced an XT model in October 1983 that can execute the S/370 instruction set and run under a subset version of VM/SP. It can operate in a truly distributed environment as a S/370 workstation and run many of the same application programs that can run under VM/CMS. It has less than half the performance of a 4321 or less than 0.1 MIPS for the programs it can run. The PC/AT introduced in August 1984 is also offered in an 370 version that can also run VM/SP. The PC/AT performance is about 0.15 MIPS.

Another PC version is called the 3270/PC, which has the power of a PC and the facilities of the IBM 3270 terminal family, which is rapidly becoming the standard protocol for interfacing the data streams from one IBM computer system to another.

IBM also announced the PCjr for the home market on November 1, 1983. It runs under the same operating system as the PC. It can also support an asynchronous modem so it can communicate with other systems.

New hardware has been only one part of the IBM story. A flood of new software has also been introduced to support the new hardware and its new features. In addition, IBM introduced its "R" relational database for its mainframe systems, calling it Database 2 (DB2). IBM has emphasized that DB2 is not replacing IMS, but is a complementary product to IMS. Both can coreside on a processor and users can access data stored in either/both IMS and DB2 files. Such an arrangement requires an **enormous** amount of memory, which is probably why the 3084 is now available with **96M bytes** of memory.

The Query Management Facility allows users to query either DB2 or SQL data files. Thus, at the same time IBM added a new database facility, it has brought all its database facilities together after a fashion.

In the midst of all this activity and the dispersion of products into all the data processing market places, SNA has been the "glue" that binds everything together. The importance of SNA continues to increase and will continue to do so as IBM moves more and more into the information processing era. SNA is becoming more powerful, and it is becoming easier to use as end users become unaware they are even using a computer. SNA will continually develop in an evolutionary way, pulling all of IBM's past, present, and future products together.

Many issues still remain to be resolved:

- How will the Computer-Based Exchanges (CBXs) fit into the communication/data processing environments?
- What will be the interrelationship between the CBXs and LANs now in development and the office of the future?
- How will network management and administration be handled?
- How will SNA change to meet the new standard being adopted for the **session** and **transport** levels of the OSI model?

Most mainframe vendors believe data processing is inextricably connected with communication and the vendors of CBXs. Many computer mainframe vendors have formed alliances with CBX vendors. IBM formed a joint venture with Mitel then severed it, reportedly because Mitel had delays in its software development for its SX2000 switch. IBM then turned around and formed a joint venture with Rolm, then IBM acquired Rolm in September 1984. Evidently, IBM planners believed they could not afford to wait to develop their own CBX system and were willing to buy the expertise on the outside. How well the Rolm/IBM merger will work remains to be seen. They are very different in management styles.

Certainly, CBXs and LANs offer many of the same facilities. The CBX solution to the interconnection of local devices is the one with which most users are familiar. LAN vendors, however, maintain the long-term solution for local interconnection will require a LAN or a series of LANs that handle data, text, voice, and video. LAN vendors contend the CBX solution requires too many wires, provides too low a bandwidth, and concentrates control in a single switch, making the whole vulnerable to equipment failure.

Proponents of the CBX solution point out that most buildings contain wiring for connections to a central switch with existing PABXs. Also, they question the requirement for 10M-bps data rates, and they point out that central switches can be duplicated (for redundancy) so the system is not dependent on a single control unit. CBXs will support the T1 carrier (1.544 bps) for high data rates when required.

Old buildings will probably not be rewired to support LANs, but many new buildings will be. As the industry moves into the information processing era, more and more bandwidth will be required. It has been suggested that bandwidth may well become like memory. No matter how much memory users have, they always want more. Thus, no matter how much bandwidth users have, they will want more. As more and more reports of successful LAN installations are written, more and more users will want them.

Many vendors are now offering LANs to interconnect IBM PCs as well as other PCs. IBM has proposed a token-passing LAN standard to the IEEE 802 Committee. IBM indicated it would introduce a token-ring LAN within 2 years when it announced its cabling system. The assumption is that many companies will have the IBM Cabling System in place when the LAN products become available. In the meantime, the company announced the PC Cluster and PC Network.

The recommended Open Systems Interconnection (OSI) model of the International Standards Organization (ISO) is the model each vendor claims it uses for its distributed network architecture.

The difficulty is that SNA as well as other distributed architectures have been developed and used without the specifications for each level of the OSI model ever being standardized. In fact, the organization of the OSI model is primarily based on the structure of SNA, which was announced **over 10 years ago**.

So far, the OSI session, transport, physical, and data link levels, the 4 lowest levels of the OSI model, are the only ones formally adopted.

The OSI committee is moving rapidly, and SNA, as well as distributed architectures from other vendors, will undergo changes to bring it into line with the OSI model. Perhaps, gateways

 ©1984 Data Decisions

IBM SNA
System Network Architecture

will be used to interface SNA to OSI networks.

IBM's approach to interfacing X.25 networks is through its Network Interface Adapter (NIA) with software support in NCP residing in the 3705/3725 Communications Processor. The SNA boundary is at the X.25 interface, which supports multiple point-to-point virtual circuits between two SNA nodes or between an SNA node and a non-SNA node. The IBM X.25 interface supports the error control procedures in X.25, but IBM provides end-to-end control only with an SNA node to SNA node version. IBM's statement of direction for its communication facility for the 3705/3725 is that it will interface to X.25 directly and not require an NIA. The first product to do that is the IBM 3274 Control Unit. New microcode supports X.25.

Most outside vendors interface their products to SNA networks by emulating the LU2 device protocol, which is the protocol used by the IBM 3270 Cluster Controller. Some vendors provide software emulation; others provide both hardware and software emulation. Only COMTEN/NCR has attempted full transport layer support for SNA. Emulating the LU2 protocol is complex. IBM has 2 control units, 3 displays, and 2 printers in the current 3270 product line. It has over 2 million 3270s installed and is shipping up to 500,000 per year. Undoubtedly, there will be more models and features offered.

Other approaches also present problems. The NTO interface is limited. The public data networks are providing protocol conversion for interfacing to SNA, but being able to transport data is not necessarily communicating. Users can add support for non-SNA terminals in the user application programs.

IBM is implementing its Document Interchange Architecture in the SNA Application layer with its DISOSS/370 products. Many of the IBM systems can perform services for each other and interchange messages and documents: S/370 hosts, 8100, Displaywriter, 5280, 5520, Scanmaster 1, and the PCs. The SNA Distribution system (SNADS) is also offered for a number of systems for peer-to-peer distributions.

One of the greatest weaknesses in all distributed networks, not just SNA, is in its network **Management and Administration**. This includes:

- Managing the problems that occur in the network and establishing default facilities.
- Making changes to the network without disrupting other facilities on the network.
- Measuring performance in terms of response times and overall throughput.
- Cost allocation for use of network facilities.

IBM provides a number of products for network management, but there is generally a need to tie all the products together through a Network Control Center (NCC). SNA does not provide enough facilities for performance measurement and cost allocation. IBM now offers a plan with guidelines for the user to develop an NCC.

SNA has truly made substantial progress since its inception in 1974. The path has been one of evolution, not of revolution. The changes have been extraordinary considering the hundreds of hardware and software products SNA must combine. Some of SNA's problems stem from its heritage of host orientation. Decisions based on methods to distribute processing away from the host has produced multiple contendors for the distributed processor label: Series/1, System/36, System/38, 8100, and 4300. IBM seems to make clearcut choices reluctantly. System/36 and /38, 4300, and 8100 appear to be in contention. Eventually, each will evolve into a market niche, as SNA will evolve into a network for the information processing era. System/36 and System/38 are playing a larger part in SNA with their implementation of LU 6.2 protocol for shared transaction processing tasks. The ubiquitous Series/1 continues to develop. The PC System/36 development effort is producing an avalanche of products. The PC workstation is going to be everywhere.

☐ Modes of Operation

An SNA network can be operated as a distributed processing system with independent subsystems performing local processing while appearing to the host as a terminal (data entry, batch, RJE, HASP, or interactive). Subsystems can be any of IBM's distributed processing systems which include virtually all of IBM's current product lines and many of IBM's older systems; such as the S/360 and S/370 computers, that are no longer marketed. With new releases of ACF/VTAM and ACF/NCP, independent SNA networks can be interconnected through one or more gateways so a user can have access to up to SNA 255 networks.

☐ Ease of Use Features

A high-level language is available to generate NCPs for 3705/3725; it includes system, configuration, block handling, and generation delimiter macros. The language processor runs under DOS/VS, OS/VS1, or OS/MVS on S/370-compatible processor.

There are user-friendly features available for the 8100 as a distributed processor. DMS/DPPX (Development Management System) permits interactive application program development locally, specifically for submission of transactions to CICS/VS or IMS/VS on S/370-compatible host. DMS facilities include TUTOR (provides explanations for novice), PROMPT (lists options available), and HELP (for assistance). DPPX/DTMS (Database and Transaction Management System) provides facilities to create, maintain, query, and execute transactions on databases.

Other facilities include assistance for programming application display and printer formats, monitoring system use and performance, and developing programs for DPPX on a host system before an 8100 is delivered. Host facilities for S/370-compatible processors running CICS/VS, TSO, or VM/370 provide additional application development aids for the 8100 running under DPCX. DMS/CICS/VS is an application development aid for developing transaction processing programs to run with CICS/VS and any OS/VS or DOS/VS S/370-compatible system.

Application Development Facility (ADF) relieves programmers of coding many of the modules needed for IMS/VS applications; the user defines rules/parameters to be stored in a table referenced by functional modules that tailor applications to the user's specification.

The Teleprocessing Network Simulator (TPNS) allows users to test applications programs in a simulated network environment. It can test in both a single- and multiple-domain network environment.

IBM provides many facilities to improve productivity by making various operations easier to perform. Installation Productivity Options (IPOs) consist of pregenerated, component-synchronized composites of software modules that can be tailored for specific environments. IPOs are available for most of IBM's major operating systems such as OS/MVS and DOS/VSE. The Interactive System Productivity Facility (ISPF) and ISPF/Program Development Facility (PDF) make it easier to develop interactive applications.

☐ Strengths

IBM has a long record of success in the computer field. For most of those years, IBM was praised for its marketing and business management acumen, and castigated for its mundane hardware and software. Yet IBM was the first vendor to introduce a family of computers running under one operating system (S/360). Although OS/360 was long delayed and inefficient, it did do almost everything for almost everybody. IBM has supported its user community providing upgrade paths (although not always to a customer's liking), through emulation and conversion aids, or by the VM/370 umbrella which supports multiple environments. The OS/360 user environment was revised and upgraded within the S/370, 3030, 3081, 3083, 3084, and 4300 Series to include virtual memory, expanded telecommunications facilities, SNA, database management, transaction processing, and multiple processor support.

IBM has gradually built a reputation as a technical leader in software and hardware development, although IBM has failed to grasp the importance of some markets. Amdahl, for example, capitalized on IBM's neglect of the top of its line as much as on its technical excellence to develop the Amdahl processors. IBM also was slow to respond to the large minicomputer market, and only recently developed a personal computer product. Having recognized a market, however, IBM can go after it with a

 ©1984 Data Decisions

IBM SNA
System Network Architecture

vengeance, as it has with the 3081, 3083, and 3084 mainframe models and with the personal computer. IBM was the first to develop the small business market with its System/3. IBM was also the first to announce a network architecture, which included the first bit-oriented protocol. IBM was the first to offer 64K-bit RAM chips in a commercial product (the 8100). IBM was also the first mainframe vendor to make a mainframe product (4300) price-competitive with minicomputers.

IBM must stay at the forefront of technology if it is to continue growing. Many markets depend on technology to make appropriately priced products. For example, the home computer customer will not subscribe to remote database access as long as communications costs are high. When costs come down, that market can develop.

IBM has a huge customer base to maintain and upgrade, thus IBM will continue to produce compatible products to move its base gradually into new applications. Its base is large, and IBM can spread the cost of developing applications software over many systems. The company can make money and still charge less than other vendors for comparable software because IBM's base is an order of magnitude or two larger than other vendors' bases.

Standards, developed by standards organizations including the American National Standards Institute (ANSI), International Organization for Standardization (ISO), Consultative Committee for International Telephone and Telegraph (CCITT), and Electronic Industries Association (EIA) are always influenced by what IBM is doing.

Increasingly, data processing markets are also data communication markets. Sometimes, IBM's influence is a result of its size and domination of world data processing/communication markets. At other times, the influence stems from IBM having a standard to propose when other vendors have none to offer. This appears to be the case with IBM's Document Interchange Architecture (DIA), Document Content Architecture (DCA), and Graphic Code-Point Descriptors (GCD). They are likely to be adopted as standards simply because they are the only ones proposed.

IBM has shown it understands what it takes to maintain its growth of about 14 percent per year. It needs to be involved in almost every data processing and communication market. To achieve this objective, IBM has used acquisition and contracts with outside vendors as well as internal development to enter new markets.

Last but not least, IBM has the largest computer sales and service organization in the world, so an IBM system can be serviced anywhere. The IBM distributed network concept as implemented in versions of SNA will therefore be supported by all of these IBM "strengths." SNA has evolved and matured and it works. Users can look forward to a future in which IBM continues to extend its flexibility and versatility in response to market pressures both from users and competitive vendors.

☐ Limitations

IBM's size means that it can set de facto standards for the computer industry in many areas. In other areas, however, it cannot. The ISO organization is worldwide, and IBM cannot dominate it. IBM tries to influence standards organizations and drags its feet on producing compatible products until forced to do so. For example, IBM introduced products to interface to X.25 packet-switched networks in Canada and Europe but not in the U.S. until July 1981 after considerable customer pressure. IBM should support multivendor networks more strongly in the future. The company cannot lock out foreign computers, networks, or terminals from interfacing to SNA networks and remain competitive.

IBM's strength of a large base that provides stability and an assurance of a compatible stream of new products is also a major limitation. The large base makes it difficult for IBM to change direction or to move quickly. The base is just too large. Smaller vendors can offer innovative products that provide new ways to do business. They are riskier to use than IBM products, yet the rewards are potentially greater, frequently offering a large competitive advantage. IBM's major "limitation" therefore relates to keeping SNA compatible with its large installed base while, at the same time, remaining competitive with newer state-of-the-art products and networking technologies.

Network management is the greatest limitation of SNA. Changes are difficult to make, requiring system generation when alternate routes are put in the system. An industry analyst has stated that if "AT&T had developed the telephone system like SNA, everybody would have to hang up when a new phone was connected."

The Communications Management Configuration (CMC) solution required a large expensive host and put all the "eggs in one basket" making it risky. With the introduction of the 4300 Series, it is likely that IBM will eventually offer a CMC based on the 4300 and incorporate backup capabilities.

IBM has developed the Information/System, a licensed interactive retrieval program with related utilities for problem, change, and configuration management. Designed for helping managers to fine tune their systems in addition to day-to-day management of the system.

SNA is host-dependent and is not network-oriented in the sense of multivendor networks. It is not built on industry standards, which will eventually be required for multivendor environments. SNA is growing more complex all the time and is difficult to understand.

On the other hand, IBM has made SNA reliable, flexible, and easier to install. Also, the gap between IBM's capabilities and its competitors are getting larger not smaller. The changes to SNA are taking place more rapidly than at any time since it was announced. This is due to its all encompassing nature. Virtually all of IBM's products fall under the SNA umbrella.

■ ARCHITECTURE SUMMARY

SNA was originally developed to integrate the elements of a data processing network built around a single host computer, and its structure reflects that origin. SNA is a host-controlled architecture, although a network can include multiple hosts. Each host controls its own set of network resources, called a **domain**. A network can contain a single domain or multiple domains. It can consist of multiple single domains where one domain communicates with its own resources but not with the resources of another domain. A multiple-domain network, however, provides facilities for cross-domain communication, and a user in one domain can use resources from another domain. Each physical unit (PU), logical unit (LU), data link, and data link station in a network belongs to one domain or is shared by multiple domains. Domains maintain a peer-to-peer relationship to each other. Shared control is a relatively new feature of SNA. Multiple domains can concurrently share control of communication controllers and data links, and serially share PUs and LUs; see Figure 1.

The development of SNA has resulted in 5 different versions, some of which are incompatible.

SNA 1 (1974) • defines basic architecture structure; tree-structured net with single system service control point (SSCP) in root node; one domain; SSCP in VTAM access mode software in S/370 node; supports only SDLC transmission and SDLC terminals • technically includes those features implemented in VTAM 1.1, NCP 1.3 • not compatible with other versions.

SNA 2 (1975) • extends support to BSC and Start/Stop terminals; still one SSCP and one domain • technically includes features supported by VTAM 2, TCAM 10, NCP/VS 1.4 and 1.5 • not compatible with other versions.

SNA 3 (1976) • major revision; multiple tree-structured nets, each with control point hosts and domains; allows sessions between 2 logical units in 2 different domains, intercommunications close to root of net; remote NCP nodes connected to single local NCP node; one route between subarea node pairs; SSCP performs session outage notification • technically includes features supported by ACV/NCP/VS 1, ACF/VTAM 1.1, ACF/TCAM 1.1 • can coexist in networks with SNA 4.1 and SNA 4.2 implementations.

SNA 4.1 (1979) • still one route between subarea node pairs • technically includes features implemented in ACF/NCP/VS 1.2, ACF/VTAM 1.2, ACF/TCAM 2.1 • can coexist in networks with SNA 3 and 4.2 implementations.

SNA 4.2 (1981) • introduced concurrently with 4300 announcement • no longer any distinction between local and remote NCPs • supports multiple parallel SDLC links between

©1984 Data Decisions

IBM SNA
System Network Architecture

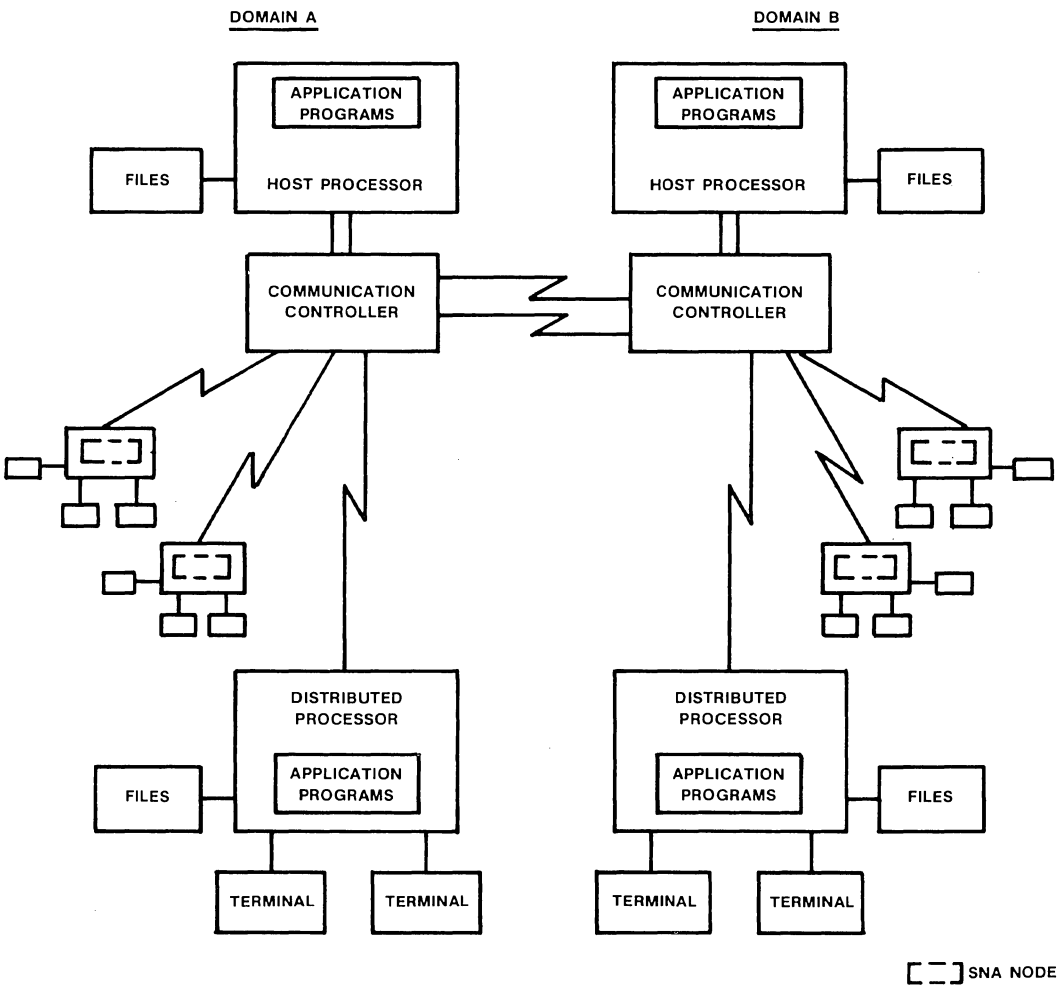


Figure 1 • distribution of resources between two host processors.

adjacent 3705s, logical grouping of links between adjacent nodes, multiple transmission priority levels, and additional verification/error features • technically includes those features in ACF/NCP/VS 1.2, ACF/VTAM 1.3, and ACF/TCAM 2.3 • can coexist in networks with SNA 3 and 4.1 implementations.

SNA Today (1984) • supports both 3705/3725 communications processors on one network; requires ACF/NCP 2.0 for 3705 and ACF/NCP 4.0 for 3725, ACF/SSP 3.0/4.0 for host support of program preparation; ACF/TCAM 2.4, ACF/VTAM 2.1, 2.2, or 3.0, MVS on host system; also requires EP for 3725, NTOR1.2. or 2.1 for 3725, X.25NPS1 1.4.1 or 1.4.2 to support 3725; other host programs to support 3725 include EREP 1.5, NPM, NPDA 1.0, NCCF 2.2, and NLDM • ACF/VTAM 2.2 or above running under MVS/370 or MVS/XA provides a gateway for interconnection of separate independent SNA networks; channel-to-channel connected host systems on separate SNA networks can use ACF/VTAM 2.2 as the gateway; ACF/VTAM 2.2 on a host system uses ACF/NCP 3.0 or above running on an IBM 3705/3725 front end as the gateway for interconnection of up to 255 separate independent SNA networks • the gateway is transparent to network users • new releases of other programs support the gateway, new 3710 Network Processor, 31-bit addressing under MVS/XA: NCCF 2.2, NLDM 1.1, 1.2, and 1.3, NPDA 2.0 and 3.1 or 3.2, MVS/OCCF, Information/Systems 1.2 and VSE/OCCF 1.1 or 1.2 • VM increasingly operating as a native mode system rather than umbrella system with guest operating system previously only MVS, MVS/XA, and VSE systems operated as SNA hosts; VM in native mode is still limited, but it is moving toward parity with MVS and VSE with many new communication packages available for VM: ACF/SSP 3.0, EREP 3.1, TPNS 2.3, ACF/VTAM 3.0, RSCS Networking Version 2.0, NCCF 2.0 • IBM has stated it intends to support NPDA, NLDM, and X.25 NPSI under VM/SP and to continue enhancements for ACF/VTAM in VM/SP environment.

■ DISTRIBUTED SYSTEM MANAGEMENT

Networks are set up to handle at least 3 data processing functions—sessions, jobs, and transactions.

For sessions, a terminal or applications program is connected to a subsystem in one of the processors on a network for a conversation; the terminal or application logs on for the duration of the conversation then logs off. Primary products associated with session control are ACF/VTAM MSNF, ACF/TCAM MSNF, and ACF/VTAME. Both job and transaction processing use session networking control to establish connection between endpoints and to route information through the network.

For jobs, batch entry subsystems route jobs through the network to the processor which will execute the job and return results. Primary products that implement job entry applications are MVS/

 ©1984 Data Decisions

IBM SNA
System Network Architecture

SP-JES2 R2, MVS/SP-JES3 R2, JES2/NJE, JES3 networking PRPQ, RSCS Networking for VM/370, JEP and FTP with VSE/POWER and DOS/VSE, and JNF with VS1.

For transaction processing, the network routes transactions according to the information supplied with a message to the appropriate subsystem on the network. Primary products used to implement network transaction processing are IMS/VS MSC, CICS/VS ISC, DPPX Data Base and Transaction Management System (DPPX/DTMS) and Airline Control Program Transaction Processing Facility (ACP/TPF).

☐ Network Management

The combination of Advanced Communications Function/Network Control Program/Virtual System (ACF/NCP/VS), running in the 3705/3725 Communications Processor, and Advanced Communication Function/Virtual Telecommunications Access Method/Virtual System (ACF/VTAM/VS), running in the host processor, form a network operating system. NCP provides line control and path control to route data through the network, and VTAM oversees the entire network and provides access to application programs. To implement all the bells and whistles of SNA, including the Cryptographic Subsystem for system and data security, ACF/VTAM/VS must run under MVS or MVS/XA operating system in an IBM/370-compatible host. MVS can run under the VM/370 umbrella and gain the advantages of its features. ACF/VTAM/VS can also run under VM in native mode.

A 4300 processor running ACF/VTAM or ACF/VTAME under SSX/VSE or DOS/VSE can operate as an SNA node or distributed processor. In addition, VM/VTAM Communications Network Application (VM/VCNA) running as an applications program under ACF/VTAM or ACF/VTAME allows VM/CMS systems to be part of SNA networks accessing application programs on other systems and offering CMS services to other terminals on the network.

Network Communication Control Facility (NCCF) • a VTAM application program that provides network control for operators at designated 3270 terminals; allows network operator to execute ACF/VTAM, ACF/VTAME, or ACF/TCAM commands and receive access method messages from network; provides communication and database facilities for collection, storage, and retrieval of network errors to support NPDA; operates as base for IBM or user-written Communications System Management Applications • improvement on Network Operations Support Program (NOSP) • Terminal Access Facility allows NCCF operator control of CICS/VS, IMS/VS, HCF (Host Control Facility), and TSO; standard feature of NCCF 2.0 and above for MVS, MVS/XA, and VSE/AF • NCCF 2.0 available in native mode under VM • now at version NCCF 2.2; provides operator control and configuration load support for IBM 3710 Network Controller, (unavailable for VSE/AF version) 31-bit addressing on MVS/XA, and VSE/AF telecommunications users • program services for NCCF 2.1 will be available until December 31, 1985.

NCCF 2.0 for VM/SP and VM/SP HPO • same facilities as provided in 2.0 for MVS:

$1,800/$1,620 initl	$300/$270 mo	$30/$40 serv

5665-316 NCCF 2.2 • for MVS/XA in 31-bit addressing mode; available second quarter 1985:

2,550/2,295	425/383	60/96

5666-285 NCCF 2.2 • for VSE/AF; available fourth quarter 1985:

1,050/940	175/158	20/32

5668-947 NCCF 2.2 • for MVS/370 and MVS/XA in 24-bit mode; available first quarter 1985:

2,100/1,890	350/315	50/80

Operator Communication Control Facility (OCCF) R.1 • allows 1 or more remote MVS systems to be operated from a host system; program resides in the remote system(s) and optionally in the host; functions include sending commands issued at the host to the remote for execution, intercepting messages at the remote system and routing them to the host for reply or information, having predefined replies for write to operator with replies (WTORs), generation of a series of commands through a command list, and 3275 data stream emulation support for the Remote Operator Console Facility (ROCF) of the 4341 MVS and 4300 DOS/VSE processors • for local operations, requires MVS/SP-JES2 1.3.2 for remote operations, requires NCCF 1.2, ACF/VTAM 1.2 or later with Multi-System Networking Facility (MSNF), or ACF/TCAM 2.2 or later with MSNF:

990/740	330/245	8/13

Network Performance Monitor (NPM) • replaces Network Performance Analyzer (NPA); provides extensive facilities to assist an ACF/VTAM customer in managing a communication network: realtime monitoring of the network and color graphics displays of network status to allow users to identify performance problems and fine-tune the system • collects the network data needed to manage network resources efficiently; enhances the functions of the Network Performance Analyzer (NPA); measures host response time and in many environments, computes network response time • can display response times by application, virtual route, major node, line physical unit, logical unit, or group of logical units • automatially alerts the network operator when performance degradation exceeds user-specified thresholds; full-color monitor graphics can be dynamically updated to show the applications, lines, or nodes with the worst response times; measures transaction volumes as packets of information flow through the ACF/VTAM and ACF/NCP SNA layers; provides average packet size, bytes per second, messages per minute, and polling rates • network analysts can use the data to access the performance of various network components by viewing displays of error counts, NCP buffer pool levels, outbound queues, channel queues, and NCP slowdown measurements • stores its data in online VSAM files for retrieval; selected information can be logged in a file for later processing by off-line programs; runs under MVS/370 or MVS/XA; requires ACF/VTAM V1R3 or ACF/VTAM R2 on host system and ACF/NCP V2 or V3 on 3705 or 3725 or ACF/NCP V1R2.1 or R3 with NPA controller; also requires the Graphical Data Display Manager Release 2, Presentation Graphics Feature, TSO, and DFSORT (or equivalent) to provide the optional graphics network facility • available June 1984:

3,000/2,250	500/375	57/91

Network Logical Data Manager (NLDM) • NCCF application that extends network problem determination facilities; collects SNA session-related information and makes it available to NCCF operator station • supports SNA Network Interconnection and Response Time Monitor feature on SNA 3274 Control Units • NLDM 1.3 supports MVS/XA 31-bit addressing • in statement of direction, IBM indicated it will extend NLDM to VM/SP environment • runs in MVS/370 and MVS/XA environment • requires ACF/VTAM 3.0 or about, ACF/NCP 4.0 for 3725, and NCCF 2.2 for full functionality • available first quarter 1985:

1,305/979	207/155	24/38

Teleprocessing Network Simulator • designed to test online application programs, control programs and networks; executes as an ACF/VTAM application program, eliminating need for a communication controller (3705/3725) in some environments • supports extended addressing, simulation of X.25 network and PU 2.1 network nodes (those that support LU 6.2 such as System/36 and System/38), enhancements for 3725 such as modules 128 transmission and enhanced support for simulation of asynchronous terminals, SNA networking enhancements, sample ACF/VTAM application programs and other capabilities • TPNS 2.3 operates under VM/SP in native mode as well as under MVS/370 and MVS/XA:

NC/NC	1,875/NA	NC/NC

INTL: first number is initial license fee for primary system, second figure is initial license fee for distributed system (DSLO). MO: first figure is monthly license fee for primary system, second figure is monthly license for distributed system (DSLO). SERV: first figure is Monthly Licensed Program Support Charge (MLPSC), second figure is Monthly Multiple Licensed Program Support Charge (MMLPSC). OTC: one-time charge when applicable. All prices are current as of November 1984.

 ©1984 Data Decisions

IBM SNA
System Network Architecture

Network Problem Determination Application (NPDA) • provides an orderly way to alert the user of potential troubles, helps locate failing resources, and offers direction to resolve problems • runs under NCCF 1.2 or above and can be initiated by an NCCF operator at an NCCF terminal; uses cross domain capability of NCCF to display collected data in remote NCCF domain; allows operator to enter data into Information/Management database; supports IBM's modems and 3867 Link Diagnostic Unit • provides HELP facilities; supports SNA and non-SNA devices attached to a 37X5 and operating in SNA-controlled network; supports SNA and non-SNA devices attached to a loop adapter on 4300 and operating in an SNA-controlled network; supports 3270 devices attached to 37X5 controller with 270X emulation program (EP) or partitioned emulation program (PEP), and operating in non-SNA environment (for MVS/370 and MVS/XA only); supports 3270 devices attached to a 270X Transmission Control Unit and operating in non-SNA-controlled network (for MVS/370 and MVS/XA only), and other devices locally attached to the network host system (for MVS/370 and MVS/XA only) • Threshold Analysis and Remote Access (TARA) feature supports 3600 Finance Communication system for problem determination, performance data, alert generation, and remote operation • NPDA 3.2 provides enhancements that support 31-bit addressing of MVS/XA, IBM 3710 Network Controller, report record logging facility, and enhanced HELP function • requires NCCF 2.2 • IBM has stated it intends to extend NPDA to VM environment • 5668-920 NPDA 3.2 • for MVS/370 and MVS/XA in 24-bit addressing mode; requires ACF/VTAM 2.1/2.2/3.0 or ACF/TCAM 2.4; available first quarter 1985:

1,650/1,237	264/198	22/35

5665-321 NPDA 3.2 • for MVS/XA in 31-bit addressing mode; requires ACF/VTAM 3.0; available second quarter 1985:

1,920/1,440	320/240	28/45

5666-295 NPDA 3.2 • for VSE/AF; requires ACF/VTAM 2.1/3.0; available fourth quarter 1985:

825/618	132/99	16/26

3600/4700 TARA Feature • for all versions:

1,210/907	176/132	19/30

☐ Session Management

Through the Multiple System Network Facility (MSNF) in either ACF/TCAM or ACF/VTAM, Network Addressable Units (NAUs) of one system on a network can communicate with NAUs of other systems. An NAU can be an SNA-SDLC terminal, a non-SDLC terminal, or an application program/subsystem. For example, an SNA-SDLC device/terminal on one system can communicate with an application program/subsystem on another system. A 3270 BSC device/terminal on one system can communicate with an application program/subsystem on another system. A 274X or TWX device/terminal can communicate with Timesharing Option (TSO) and application program/subsystem on another system. An application program/subsystem on one system can communicate with an application program/subsystem on another system. The requirements are that the communicating subsystems must be NAUs, and both systems incorporate the appropriate software to perform the required functions.

Multiple System Network Facility (MSNF) • included with ACF/VTAM 2.0 or above and ACF/VTAME • requires ACF/NCP/VS; allows Logical Unit (LU) in one domain to access LU in another domain on network; multiple sessions can be set up between LU (such as an IMS database) in one domain and LUs (such as transactions) from different domains • requires initiation through session between SSCPs in both domains; once initiated, session between LUs is direct without SSCP intervention; requires primary LU to notify SSCP of session termination • MSNF under ACF/VTAM 3 and above supports multiple routes between NCPs and hosts, up to 3 transmission priority levels for application sessions, and global network flow control to prevent overloading particular NCP or host (See Interactive Processing Management section for details on applications-oriented Session Management.)

SNA Network Interconnection (SNI) • allows terminals on one SNA network to access resources in another SNA network; the cross-network communication is transparent to the user • provided by ACF/VTAM 2.2 and ACF/NCP 3.0 and above which operate as gateways between SNA networks; an ACF/VTAM gateways can use multiple ACF/NCP gateways and an ACF/NCF gateway can service multiple ACF/VTAM gateways • other products that operate with SNI gateways are NCCF 2.0, NLDM 1.2, NPDA 3.0 or above releases and MVS or MVS/XA host systems • allows for interconnection of up to 255 networks; addressing within an SNA network is independent of addressing in other networks, thus addresses can be revised across networks.

Prior to Version 3, ACF/VTAM ran in the MVS or VSE environment. It ran on VM systems under a guest operating system. ACF/VTAM 3.0, however, can run in native mode under VM/SP 1.4. In addition, ACF/TCAM 3.0 is a restructured TCAM product that can run as an application program under ACF/VTAM 2.0 or 3.0, which are running in turn under an MVS or MVS/XA operating system. ACF/TCAM 3.0 cannot run under VM/SP in native mode.

☐ Host Access Methods

Virtual Telecommunications Access Method (VTAM), the main access method, provides direct network control. Telecommunications Access Method (TCAM) offers most of the same features as VTAM, but is used primarily for installations that have older TCAM applications programs to run. Also, TCAM provides a better interface to user terminals. ACF/VTAM application programs provide LU functions and all end-user functions of SNA network. ACF/TCAM applications, on the other hand, are the end users and ACF/TCAM contains the LUs for the application. SSCP (System Service Control Point) resides in VTAM or TCAM.

ACF/VTAME is a simplified version ACF/VTAM that includes features of ACF/NCP to run on a 4300 with an integrated communications adapter.

VTAM • generic term referring to ACF/VTAM and ACF/VTAME • supervises network control; passes control information to NCP in communications processor to allow NCP to handle the message traffic between host application programs and terminals on network • owns all network resources and allocates them in response to requests from application programs; connects and disconnects application programs to/from all local and remote terminals on network and controls access to network; controls data transfers between application programs and terminals, where line discipline and physical characteristics of terminal's attachment is transparent to application program; allocates terminals to application programs; allocates network paths between application programs and terminals; network components, such as communications controllers and lines, are shared with other active applications; terminals multidropped on one line can be allocated to different applications • supports concurrent execution of multiple teleprocessing applications and controls sharing of facilities among programs in single host or in multiple hosts with Multiple System Network Facility (MSNF) • supports SNA and locally attached 3270 and 3790 terminals as well as some pre-SNA terminals through facilities in communications processor (3705/3725) under NCP or in 4321/4331/4361 communications adapter under VTAME • provides operator control of network management functions through Network Communications Control Facility (NCCF) and network statistics gathering for tuning and accounting purposes • allocates buffers dynamically for testing, tuning, and tracing facilities • **ACF/VTAM** 2.1 supports both integrated communication adapter and 3705/3725 front-end on 4321/4331/4361 • **ACF/VTAM** 2.2 supports interconnection of independent SNA networks through one or more gateways; gateway SSCP in ACF/VTAM 2.2 running on MVS/370 or MVS/XA system uses ACF/NCP 1.3 gateway running on 3705/3725; ACF/NCP 1.3 can interconnect up to 255 SNA networks; gateway SSCP can use one or more ACF/NCP R3 gateways • SNA networks can reuse name and addresses of Network Addressable Units (NAUs); the gateway SSCP provides translation • gateway is transparent to network user.

ACF/VTAM 3.0 • has been announced for VM/SP 1.4, MVS/XA SP2, MVS/SP1, and VSE/AF 2.0 • the product for VM/SP 1.4 offers basically the same facilities provided for ACF/VTAM 2.1 with added support of the integrated Communications Adapter for the 4300 • ACF/VTAM 3.0 for MVS/XA, MVS/370 and VSE entends network addressing and virtual storage by supporting

 ©1984 Data Decisions

IBM SNA
System Network Architecture

31-bit addressing; supports NLDM 1.3.

5664-280 ACF/VTAM 3.0 for VM/SP • provides essentially same facilities as ACF/VTAM 2.1; does not support SNI facilities of ACF/VTAM 2.2 • operates in conjunction with new facility in VM/Group Control System (GCS) provided in VM/SP 1.4; does not require a separate guest operating system but resides in a virtual machine that is a member of a GCS group • provides VM SNA console support and operates with RSCS Networking 2.0, VM/SP HPO 1.4, ACF/NCP 3.0, NTO 1.2.1, and NCCF 2.0 • in a statement of direction, IBM indicated the company intends to provide the following products for VM/SP native mode: ACF/SSP, NPDA without TA and RA feature, NLDM, and X.25 NPSI • in addition, the company intends to continue enhancements of ACF/VTAM in VM/SP native mode:

$3,300/$2,275 initl	$1,100/$825 mo	$225/$360 serv

5665-289 ACF/VTAM 3.0 for MVS/XA • intended as replacement for ACF/VTAM 2.1 and 2.2 for MVS/XA:

5,850/4,389	1,950/1,463	275/440

5665-313 ACF/VTAM 3.0 for MVS/370 • intended as replacement for ACF/VTAM 2.1 and 2.2 for MVS/370:

4,800/3,600	1,600/1,200	250/400

5666-313 ACF/VTAM 3.0 for VSE • intended as replacement for ACF/VTAM 2.1 for VSE:

900/810	300/270	75/120

ACF/VTAME • special entry-level version of VTAM • runs on 4321/4331 to support the integrated communications adapter; allows 4331 to interface to SNA network without 3705 front-end communications processor • includes many line control and message control functions implemented by NCP running on the 3705/3725 • upgrades to ACF/VTAM 2.0.

5746-RC7 ACF/VTAME • runs on 4300 system with the integrated communications adapter; performs certain functions of 3705/3725 running NCP:

NA/NA initl	$179/$161 mo	$75/$120 serv
$4,000/$3,000 OTC		$71/$113 serv

Basic Telecommunications Access Method-Extended Support (BTAM-ES) • based on BTAM under DOS/VS 1.34 but extended to support integrated communications adapter on 4331 under DOS/VSE control running in either S/370-compatible mode or Extended Control Program Support for Virtual Storage Extended (ECPS:VSE) mode • may be run in any or all DOS/VSE system partitions in either real or virtual mode; supports virtually all of IBM's BSC and start/stop devices as well as many channel attachment devices • can co-reside in 4331 DOS/VSE system with VTAME providing gateway to SNA networks for virtually all of IBM's BSC and S/S terminal subsystems as well as all IBM processors operating as terminals; processors include 1130 Computing System, 1800 Data Acquisition and Control System, Series/1, S/3, S/7, S/32, S/34, 5110, and 5280 • also supports many directly attached transmission control units (ICA on S370/115, 125, 135, and 138; Comm Adapter on 4331) and local terminal (2701 Data Adapter, 3702/3/5 Transmission Control Unit, and 3704/3705-I/3705-II Communications Controller) controllers with their associated terminals (2848 Display Control, 2790 Data Communications Systems, and 3270 Information Display System).

ACF/TCAM • high level access method providing high performance and comprehensive function • supports BSC, start/stop, local attached, and SDLC terminals; supports MVS/370, MVS/XA, and VS1 applications • shields application programmer from terminal types and their control; messages are queued, thus application program need not be active when ACF/TCAM is active • interfaces directly to ACF/NCP and EP; allows sessions to be established at ACF/TCAM level not application level; MSNF feature provides terminals with access across multiple hosts in the network • ACF/TCAM 3.0 has the message handler and application program interface features of 2.0, but it is restructured into a subsystem that can function as an ACF/VTAM application program • supports NTO and 3710 Network Controller, SNA Network Interconnection, Extended network addressing; does not support 31-bit addressing, thus host system must run in 24-bit addressing mode • requires ACF/VTAM 2.0 or 3.0 and MVS/370 or MVS/A running on host system; does not support EP on 3705/3725 or TSO on host; supports the NCP version supported by the ACF/VTAM version used • available third quarter 1985:

7,500/5,625	2,500/1,875	300/480

☐ Message Management

The Network Control Program (NCP), which resides in the 3705/3725 communications controller, interfaces applications programs in the host computer through the Telecommunications Access Method (TCAM) or Virtual Telecommunications Access Method (VTAM) to the SNA components on the network. NCP directs message traffic through the network based on addresses and instructions received from TCAM or VTAM. The NCP Packet Switching Interface Program provides for attaching SNA nodes to X.25 packet-switched data networks. NCP can be shared concurrently by up to 8 SSCPs; up to 4 (3705-II) or 6 (3725) can be in channel-attached hosts; others attached through remote ACF/NCP/VS systems no more than one SDLC link away.

Network Control Program (NCP) • generic term referring to ACF/NCP/VS, which now brings into one program NCP for local front-end and remote 3705 communications processors • performs 3 classes of functions—intermediate, boundary, and physical unit services • NCP intermediate function provides data link control and path control for other NCPs and host processors; operates as pipeline with some routing ability • data link control manages transmission information over I/O channel of host processor or over SDLC communications link; performs first-level error recovery procedures; checks and deletes transmission headers on receiving information and adds header on transmission; cooperates with checking hardware to generate and check the block check character; updates and verifies transmissions counters (sequence or segment numbers); and receives and routes link control data to physical unit services • intermediate path control takes messages from data link control, verifies and checks transmission header, and determines if address is local or if it should be forwarded to another NCP or host • NCP boundary function includes path control and connection point manager • path control routes messages to and from data link control; converts the network format of transmission header to local format on reception and vice versa on transmission; selects SNA resource for next leg of message transmission; segments message if terminal controller to which it is being sent has limited buffer space; and queues traffic to connection point manager for SNA resource being used • connection point manager ensures that session has been set up properly before messages can be transmitted to and from resources; ensures that logical and physical paths between 2 resources are available; provides for smooth data flow without overloading SNA resource; and performs other network functions for terminals without their own network facilities • NCP physical unit services works in conjunction with SSCP in VTAM to supervise the NCP intermediate and boundary functions; activates and deactivates links, establishes and breaks contact with SNA stations, manages network switching, reports maintenance statistics, loads and dumps contents of attached communications controller (3705/3725), and oversees testing services • non-SDLC terminals can attach to SNA network through Network Terminal Option (NTO) • Partitioned Emulation Program (PEP) extension to NCP allows 270X-mode (called EP mode) and NCP-mode operations to run concurrently on communications controller (3705/3725); supports Link Problem Determination Aid (LPDA) facility of IBM's 3863, 3864, and 3865 intelligent modems; NCP can place modem in test mode, and send commands to determine if link, data terminal equipment (DTE) and link are operating correctly; in conjunction with Network Problem Determination Application (NPDA), permits network operator at central site to initiate LPDA facilities to detect loss of carrier, loss of power to remote modem, and number of occurrences of random noise on the link; does not affect user sessions; some tests are automatic with results recorded; test results are sent to host processor • supports links up to 230.4K bps; line trace facility can trace 1 duplex or 2 half-duplex lines concurrently but tracing may affect some traffic on link • programmed and loaded from host processor either channel-attached or connected by SDLC link to 3705/3725; unlimited number of 3705/3725s in single domain can be connected in tandem and all must run Release 3 or above of NCP; NCP programs in remote 3705/3725 can communicate

 ©1984 Data Decisions

IBM SNA
System Network Architecture

over SDLC links with multiple NCP programs in remote 3705/3725s; all cross-domain communications are through NCPs and over SDLC links • supports channel connection of 3705 to up to 4 host processors and 3725 to up to 8 host processors (6 can operate concurrently) • **ACF/NCP** 3.0 allows 3705/3725 to act as gateway to interconnect up to 255 SNA networks; last release of NCP for 3705; all further enhancements will be made for 3725 only • **ACF/NCP 4.0** operates on 3725 only; supports extended addressing, enhanced network management, and 3710 Network controller • network addresses extended from 16 to 23 bits: 8 bits for subarea and 15 bits for the element allowing 255 subareas and 32K elements per subarea • requires ACF/SSP 3.0 for system generation and EP 1.2 for 3725 • supported the following host resident programs on MVS/370, MVS/XA, and VSE, ACF/TCAM 2.4, ACF/VTAM 2.1/2.2/3.0, NPM and EREP 3.0 (under MVS) • supports the following 3725 programs: EP 1.2, NTO 3.0, NRF 1.2 (MVS only) and X.25 NPSI 1.4.2 • available third quarter 1985:

$1,950/$1,755 initl	$650/$585 mo	$135/$216 serv

Network Terminal Option (NTO) • extends ACF/NCP 1.2 and above to allow non-SNA terminals access to SNA network through record mode application interface in ACF/VTAM 1.2 and above, and ACF/TCAM 2.3 and above • terminals supported are 2740 Model 1 and 2741 switched and non-switched; TWX Model 33/35 switched only; and WTTY non-switched only • interface makes terminals appear to be SDLC 3767 terminal to VTAM and TCAM • supports access to IBM Time Sharing Option (TSO) from 2741, TWX Model 33/35, or WTTY terminals; access to Virtual Storage Personal Computing (VSPC) from 2741 and TWX Model 33/35; and access to CICS from TWX Model 33/35 and WTTY terminals • independent of host operating system • separate version required for 3725.

NTO 1.3 • required to operate with ACF/NCP 4.0; provides same features as previous releases; in addition, provides extended addressing and enhancement in serviceability and performance • requires same software environment as ACF/NCP 4.0; available third quarter 1985:

660/495	206/155	12/19

Network Routing Facility • provides message routing between supported terminals without use of host processor; supports 3650 Programmable Store System, Series/1, and 3780 Data Communications Terminal; message routing options are selectable by user; user exits allow customized routing, editing, and error processing; detection of abnormal conditions with reporting to host ACF/VTAM; can route to or from CICS/VS host application using CICS/VS support for the 3650 pipeline Logical Unit • **NRF 1.2** supports extended addressing of ACF/NCP 4.0, timeout delay for better synchronization between NRF and the logical units with which it communicates, and reliability and serviceability enhancements • for use with MVS/370 and MVS/XA hosts; available third quarter 1985:

3,525/2,644	1,175/881	248/392

X.25 NCP Packet Switching Interface (NPSI) Program • allows SNA nodes to attach to X.25 packet-switched data networks; complies with Geneva Recommendation X.25 (November 1980) by CCITT • runs under ACF/NCP/VS on IBM 3705-II, 3705-80, or 3725 communications controller • 1.1 provides subset of X.25 Recommendations; also supports protocol conversion for non-SNA devices, IBM cyptographic subsystem/access method products, communication via X.25 networks to selected SNA devices via Network Interface Adapter, CICS/VS, IMS/VS, TSO and NCCF programs, and coexistence with NTO on same 3705 • 1.2 integrates support for subset of CCITT Recommendation X.25 allowing communication with X.28 terminals (start/stop mode); enables user-furnished packet assembly/disassembly support by application-level program; allows user-written host program to manage X.25 control functions • 1.3 allows SNA network nodes to interconnect over X.25 networks using SNA intermediate network node protocols; physical attachment to X.25 network uses X.21 (synchronous) non-switched adapter • 1.1 and 1.2 can run under ACF/NCP/VS 1.2.1 with ACF/VTAM 1.2 or 1.3, or ACF/TCAM 2.2 or 2.3 (OS/VS only); 1.3 will run under ACF/NCP/VS 1.3, with ACF/VTAM 1.3 or ACF/TCAM 2.3 (OS/VS only) • 1.1 functionally equivalent to IBM World Trade Packet Switching attachment; users of that unit can migrate to R.1 with no network or host applications software changes • separate version required for 3725 • see NPSI under Gateway to other Network sections.

ACF/System Support Programs (SSP) for ACF/NCP/VS • provides generation and utility functions for NCP on host processor running under DOS/VS, DOS/VSE, OS/VS1 and MVS; runs as a non-system task • NCP functions supported include parallel links between 3705/3725s; logical grouping of transmission links between SNA network nodes; multiple routes for SNA and non-SNA messages between network nodes; 3 levels of transmission priorities selectable by session; extended NCP interconnection of 3705/3725s in single and multiple host networks; extended NCP ownership; network traffic flow control; notification of session outages; route verification and error notification; line trace with transmission group option; and support for Network Terminal Option • ACF/SSP 2.1.1 or above required to support 3725 • ACF/SSP 2.2 required to generate ACF/NCP/VS 1.3.

ACF/SSP 3.0 • supports generation of ACF/NCP 3.0 for the 3705 and 3725, EP for both controllers, and ACF/NCP 4.0 for 3725; provides enhanced generation and utility functions over previous releases and configuration support for the 3710 Network Controller.

5665-338 ACF/SSP 3.0 • for MVS/370 and MVS/XA; available second quarter 1985:

1,500/1,125	500/375	65/104

5664-289 ACF/SSP 3.0 • for VM/370; supports VM/SP 1.4 and VM/SP HPO 1.4; generates EP and ACF/NCP 3.0 for 3705 and 3725; available third quarter 1985:

900/675	300/225	40/64

5666-322 ACF/SSP 3.0 • for VSE; supports VSE/AF 2.1 and VSE/SP 2.1; generates EP, ACF/NCP 3.0 for 3705, and ACF/NCP 4.0 for 3725; available fourth quarter 1985:

300/225	100/75	25/40

☐ Interactive Processing Management

IBM supplies a number of programs to support interactive processing; primary mainframe programs are Time Sharing Option (TSO), Virtual Storage Personal Computing (VSPC), Virtual Machine/VTA Communication Network Application (VM/VCNA), Virtual Machine/Conversational Monitor System (VM/CMS), Interactive Communication Control Facility (VSE/ICCF), and VM/370 Pass-Through Facility; other programs are offered on distributed processing systems such as SSP on System/34 or 36, CPF and IDU on System/38, DPPX-Command Facility and Data Stream Compatibility (DSC) feature on 8100 RPS and EDX for Series/1, and VM/PC on PC XT/370.

Time Sharing Option (TSO) • integral part of MVS • provides interactive computing in large system environment • through VTAM support, users perform applications programming; development of batch, interactive, or DB/DC directories; problem solving; and interactive program execution that require access to MVS facilities • requires NCP/VS 4.1 or 5.0 and VTAM 2.0 or later releases • supports 3270, 3277 APL Graphics attachment, 3790, 3767, 3771, 3773, 3774, 3775, 2741, TWX, 5100, and 5110 terminals • TSO Extensions (TSO/E) provides new functions, improved usability, and better response times; available for both MVS/370 and MVS/XA.

Virtual Storage Personal Computing (VSPC) • interactive subsystem for "personal computing," problem solving, and program development • allows users direct use of computer running under MVS; alternative for TSO or CMS for novice users and DP professionals • fully integrated into SNA; job entry via JES2 and 3 MVS • requires MVS 1.3; VTAM plus NCP for remote terminals, VSAM, and appropriate job entry system: JES, JES2, or JES3 MVS • supports 2741, CMC/72, 3101, 3767, 3270 line, 3287/8/9, and 3770 • IBM has functionally stabilized VSPC, meaning the company will do no more development work on it, but it will fix bugs and maintain it.

VM/VTAM Communications Network Application (VM/VCNA) • allows VM/Conversational Monitor System (VM/CMS), 1 of 4 main components of VM/370, to reside on SNA networks and execute any applications program in SNA multisystem

 ©1984 Data Decisions

IBM SNA
System Network Architecture

network, or in SNA guest virtual machine in VM/SP system; runs as an application program under ACF/VTAM or ACF/VTAME • interfaces VM console support to application program interface (API) of VTAM to support SNA, BSC or local devices as virtual machine console; with Multiple System Network Feature (MSNF) support in VTAM, same terminal can operate as console on virtual machine, or can access VTAM or TCAM applications in other systems on the SNA network • supports multiple SNA and BSC controllers on single communications line; 16 active 3705-/3725-attached communications lines; remote 3705-/3725-attachment to VM processor's channel-attached 3705/3725 running under ACF/NCP/VS; and PEP extensions of ACF/NCP/VS to allow VM-supported BSC, start-stop and local terminals to operate on same system with VM/VCNA terminals • runs in VM/SP guest virtual machine under DOS/VSE or OS/VS1 with Basic Programming Extensions (BSE); BSE supports 3262 Line Printer, 3375 Direct Access Storage Device (DASD), and 3838 Array Processor • optimizes I/O load balancing on 4300 processors and improves access to and mangement of DASD space:

$1,000/$825 initl	$402/$302 mo	$135/$215 serv

Virtual Machine/Conversational Monitor System (VM/CMS) • 1 of 4 main components of VM/370; provides an interactive computer system for problem solving, program development, and interactive applications; provides full timesharing facilities in distributed or centralized system • user can compile and execute DOS/VS, DOS/VSE, and OS/VS programs directly • user can program in assembler, COBOL, FORTRAN, PL/1, BASIC, APL, or RPG II • runs on 4300, 303X, 308X, and S/370-compatible processors with minimum 384K-byte memory • supports any VM/370 console, such as local 3270 or remote 3270 (BSC only), 3767 terminals, and 3277 APL Graphics Attachment.

Virtual Storage Extended/Interactive Computing & Control Facility (VSE/ICCF) • enhanced version of Entry Time Sharing System/II (ETSS/II) Field Developed Program; DOS/VSE interactive system for multiple terminal users performing variety of tasks concurrently: interactive preparation and execution of job streams from terminal, interrogation of job status, and VSE/POWER job queue access and change.

VM/370 Pass-Through Facility • runs in Virtual Machine under VM/370; allows users connected to one system by local or remote 3276/8/9 display terminals to access interactively applications in another system using 3270 BSC protocol • gives user full access to SNA when system running VM/370 Pass-Through is SNA host supporting remote 3270 BSC terminals • can be used as first step into SNA, gaining access to TSO, CICS/VS, VSPC, IMS/VS, and CMS; user interacts with host application as though directly attached.

System Support Program (SSP) for System/34 or /36 • provides operator Command Language (OCL) command and menu processing, main storage management, I/O management, spooling, security, help, and system measurement facilities.

Control Program Facility on System/38 • includes integral relational database and facilities to interact with it; provides control language, work management, data management, security, intra-system message, spooling, and system service facilities.

Interactive Database Utilities (IDU) on System/38 • package of multiuser data handling utilities for source entry, screen design, data file, and query applications.

DPPX—Command Facility & Command Facility Extensions on 8100 • available under DPPX operating system; extensions support the DPPX Interactive Productivity Facility (IPF), logic control, accessing and displaying menus, data entry, and tutorials.

DPPX/DSC (Data Stream Compatibility) • permits direct communications between a host 370, 303X, or 4300 and displays, printers, and clustered terminal systems connected to an 8100 system via local or remote loops, direct attachment features, or remote links; the 8100 system appears to the host as a 3270 system operatig over an SDLC link; in effect, the 8100 functions as a 3270 remote controller • supports 3600 Finance Communications Controllers, 3650 Store Controllers, 3680 Point-of-Sale Control Unit, and another 8100 running DPCX (including DOSF).

Real-Time Programming System (RPS) on Series/1 • with command language, provides interactive and transactional capabilities through supervisor, data management, communications, and general utilities.

Event-Driven Executive (EDX) on Series/1 • multiprogramming system with integral terminal management capabilities.

☐ Job/Batch Processing Management

IBM's job networking products can co-reside on network with each other as well as with transaction processing products. The Job Entry System/2 (JES2) Release 2 and JES2 with Network Job Entry (NJE) in conjunction with the Multiple System Network Facility (MSNF) support job networking in an SNA network. Session networking performs the job routing. The Job Entry Program (JEP) and File Transfer Program (FTP) allow jobs to be transferred between DOS/VSE distributed processors and host processors. The Job Networking Facility (JNF) runs on host processors under OS/VS1 to allow transferring jobs from one host to another. The Remote Spooling Communications Subsystem (RSCS) Networking feature allows jobs to be transferred for execution between systems running JES2 and NJE under VM/370. VSE/POWER provides a spooling system for DOS/VSE and offers RJE feature to remote terminals.

The job networking products require a BSC link or channel-to-channel (CTC) adapter link to a S/370-compatible processor's block multiplexer channel to receive, route, or transmit jobs. The BSC link or CTC adapter must be dedicated to NJE.

Other products that provide RJE facilities are the OS/VS2 JES3 with Remote Job Processing (RJP), the MVS/Information Distributor Workstation Support (MVS/IDWS), and DPPX/RJE facility (8100), RJEF (System/38) and RJE (under CPS, RPS, and EDX on Series/1).

Network Job Entry (NJE) for Job Entry System (JES)2 • incorporated in MVS/System Product (SP) to provide facilities to transfer jobs, data, operator commands and messages, and job accounting data from one "node" (computer system) on job entry network to another; "node" can be single system (uniprocessor, attached processor, multiprocessor system), or up to 7 JES2 systems sharing common job queue, such as Multi-Access Spool (MAS) configuration of 2 to 7 systems; NJE network can include up to 99 "nodes" • interconnection link can be BSC, SDLC, or channel-to-channel adapters.

Job Entry Program (JEP) With File Transfer Program (FTP) • JEP provides facilities to allow DOS/VSE subhost (distributed) processor to submit jobs to Job Entry System (JES) under OS/VS or DOS/VSE host; FTP works with JEP at subhost, and JES at host, to transfer files between subhost and host; output is transmitted back to originating subhost • JEP allows submission of jobs from 3790 or BSC terminals through subhost to host system on the network; FTP also allows files to be transferred back to subhost from the host (e.g., subhost can submit job for compilation, and, after completion, host can transfer compiled object code back to subhost for execution) • passwords can be required for JEP submissions to host to maintain security.

Job Network Facility (JNF) • allows OS/VS1 distributed processing system to operate as "node," RJE workstation, or Response Entry System (RES) on NJE network.

Remote Spooling Communications Subsystem (RSCS) Networking Feature • enhancement for RSCS to allow job and/or data to be transferred between systems running JES2 with NJE under VM/370 umbrella • allows VM/CMS to provide distributed processing facilities.

VSE/POWER (Priority Output Writer Execution) • spooling system for DOS/VSE; stages unit record input/output and schedules programs according to priority • Remote Job Entry (RJE) feature extends central batch facilities to remote terminal, and allows remote system backup through peer-to-peer coupling of hosts through BSC lines; requires VSE/Advanced Function and ACF/VTAM • Shared Spooling Feature supports multiple VSE/POWER installations at one site with operator control from one console when processors share Data Access Storage Device (DASD).

OS/VS2 Job Entry Subsystem 3 (JES3) With Remote Job Processing (RJP) • controls job scheduling in loosely coupled multiprocessor configuration of up to 8 MVS processors; RJP allows

 ©1984 Data Decisions

IBM SNA
System Network Architecture

remote workstation to submit job to any processor, and output can be returned to any workstation • includes console authorization scheme.

MVS/Information Distributor Workstation Support (MVS/IDWS) • provides RJE support for IBM 6670 Information Distributor on SDLC links • IDWS keeps logs and audit trails of communications to help separate and disseminate output • includes key or password protection for output.

DPPX Remote Job Entry Workstation Facility (DPPX/RJE) • runs as application program under DPPX to allow IBM 8100 Information System to operate as one or more RJE workstations.

Remote Job Entry Facility (RJEF) • licensed program • allows System/38 to function as workstation for submission of jobs to a remote host System/370, 30XX, or 43XX using BSC.

CPS RJE for Series/1 • supports Series/1 host communications through a subset of 3780 BSC line protocol on point-to-point switched or leased lines; operates with DOS/VS POWER, HASP IV, and JES2 at the host.

RPS Advanced Remote Job Entry (ARJE) for Series/1 • RJE workstation supporting Multileaving BSC.

EDX RJE for Series/1 • licensed program • supports SNA/RJE operations with host • requires 64K bytes of memory.

☐ Transaction Processing Management

IBM offers several systems to handle transaction processing in SNA networks. The primary network transaction processing system is Customer Information Control System/Virtual System (CICS/VS), which operates as a terminal-oriented transaction monitor with file processing facilities. The Intersystem Communication (ISC) feature allows CICS/VS systems through VTAM to interface to other CICS/VS systems; initiate a transaction; access database files; queue messages; or communicate directly with another transaction.

With Data Language/1 (DL/1) and DOS/VS, CICS provides the Database/Data Communications (DB/DC) Monitor for transaction processing. Additional database functions are provided by using CICS with Information Management System/Virtual System (IMS/VS). SQL/Data System (SQL/DS) is designed to complement DL/1 DOS/VS by providing a relational database structure for interactive query, report writer, and end-user database applications.

The Communications-Oriented Message System (CORMES) can run under VM/370 to run applications on a DOS/VS subsystem.

Both the IBM 8100 and S/38 can perform transaction processing, either using a local database or transmitting transactions to a host site with CICS or CICS with IMS facilities. The 8100 implements the Distributed Processing Program Executive/Database and Transaction Management System (DPPX/DTMS) for transaction processing using local database facilities. The S/38 provides transaction processing facilities on a local database through the Interactive Database Utilities (IDU) and the integral database facilities in the Control Program Facilities (CPF).

The Airline Control Program/Transaction Processing Facility (ACP/TPF) was developed specifically for the transaction processing required by airlines reservations systems. It is a terminal monitor as well as an operating system that runs in place of VM, MVS, or VSE.

System/38 under Control Program Facility (CPF) provides Advanced Program-to-Program Communications (APPC) to support peer-to-peer relationships under SNA using LU 6.2 architecture.

Customer Information Control Systems (CICS)/VS (OS/VS & DOS/VS) • although IBM calls CICS an "application program," it functions as systems program that links programs to communications terminals • has extensive file handling facilities, and provides functional links among application programs, host operating system and database facilities • provides system management, system service and application service functions • requires OS/VS1 or MVS operating system; operates under VM/370 umbrella with some restrictions • other subsets are available, and version runs under DOS/VS • supports most IBM cluster controllers and display terminals in start-stop, BSC, and SDLC modes; supports 3600 group of systems; supports Systems 3, 32, 34, 38, 370, OS/6 and 5100 (as a 2770) as remote terminals, and 3270, 3730 and 3790 as local terminals • Intersystem Communication (ISC) through VTAM, VTAME or TCAM allows transaction on one system to access files and DL/1 DOS/VS databases, initiate transactions, and queue messages to or communicate directly with transaction running under CICS/VS system on network • works with database facilities to provide comprehensive transaction processing environment with IMS/VS primary database system; DL/1 DOS/VS provides subset of IMS facilities for DOS/VS or DOS/VSE environment; SQL/DS offers relational database for the DOS/VSE environment.

Communications-Oriented Message System (CORMES) • characterized by IBM as "designed to build central paperless message exchange system" • connects terminal users to various applications programs; provides communication links to exchange action messages between terminal users, and between online application programs and terminal users; and triggers application program execution based on predefined criteria • runs under DOS/VS; supported under VM/370 in virtual machine mode • uses DL/1 DOS/VS facilities for database management and CICS/DOS/VS for data communications.

8100 DPPX/DTMS (Database & Transaction Management System) • 2 modules (Database Manager and Transaction Manager) are usable separately or together to create, maintain, and query databases, and to provide transaction-oriented processing • transaction management separates application request for processing from actual database processing; non-database-oriented application programs can request transaction service, with terminal/application freed as soon as request is entered • DTMS supports keyboard/displays, keyboard/printers, and printers.

System/38 Interactive Database Utilities • includes utilities to generate database and application menus, and to execute them • works with other Control Program Facility (CPF) features to provide host-controlled transaction environment; such CPFs include Work Management Facility, Data Management Facility, Inter-System Message Facilities, Spooling, Security and System Services Facilities • supports 5250 Information Display Systems as SNA devices; emulates 3770 console for communication with CICS and IMS running on S/370-compatible processor.

Airline Control Program/Transaction Processing Facility (ACP/TPF) • processing system for real-time applications with high message rates and many widely scattered terminals • features large centralized database with short messages for inquiries requiring less than 3-second response time • applicable to reservation and credit authorization processing.

Advanced Program-to-Program Communications (APPC) • implements SNA LU 6.2 architecture on S/36 and S/38; provides peer-to-peer relationship between S/370-compatible host system running CICS/OS/VS or CICS/DOS/VS 1.6 using ACF NCP 1.3.0 or another S/36 or S/38 running transaction processing application; S/38 can provide user services when operating as a front-end processor or data and I/O services when operating as a back-end processor, access to APPC interface is through RPG III or COBOL using DDS keywords • S/36 or S/38 provides a conversation interface that equates to CICS ISC EXEC API; it provides support to specify parameters using DDS keywords, to initiate programs in back-end processor from front-end processor, to implement automatic sign-on through password and security parameters, and to exchange any data type between applications • supports single session to CICS and multiple sessions between S/36 or S/38s.

☐ Database Management

Currently, the primary SNA database management system (DBMS) for IBM host computers is the Information Management System (IMS)/Virtual System (VS) which eventually will be replaced by the new Database 2. IBM calls IMS an "application" not a system program. The Multiple Systems Coupling (MSC) feature of IMS/VS allows up to 255 installations running any combination of local/remote communications under OS/VS1 or MVS to access each others databases. IMS/VS has its own Data Communications (DC) module which operates as a pseudo front

 ©1984 Data Decisions

IBM SNA
System Network Architecture

end for dedicated transaction processing subsystems. An Intersystem Communication (ISC) option, however, allows data exchanges between IMS/VS and CICS/VS user-written systems. CICS/VS has much better terminal control facilities than those included in DC.

IBM has implemented a subset of IMS for DOS/VS users called DL/1 DOS/VS. This use of "DL/1" is confusing because DL/1 is the data definition language for IMS, but DL/1 DOS/VS is a database management system that can operate as a standalone system and not just as a data definition language. IMS/VS can process DL/1 DOS/VS databases. DL/1 DOS/VS can process IMS/VS databases within its subset constraints. DL/1 DOS/VS does not include the DC module of IMS/VS and requires CICS/DOS/VS to allow concurrent access of the database by multiple application programs.

DL/1 Entry DOS/VS is a further subset of IMS/VS; it implements a subset of the features of DL/1 DOS/VS. It operates in batch mode or in online mode when used with CICS/DOS/VS.

The Structured Query Language/Data System (SQL/DS) is another DBMS available to run under DOS/VSE operating systems. It is a complementary product to DL/1 DOS/VS because SQL/DS can access DL/1 DOS/VS files but not vice versa. SQL/DS is a quasi-relational DBMS, a forerunner of a fully relational system.

Database 2 (DB2) is the long-anticipated relational database **R** for IBM large host systems running under MVS/370 and MVS/XA. The new query and data extraction facilities announced with DB2 bring all of IBM database management systems together.

Information Management System/VS (IMS/VS) • although not fundamentally complex, IMS/VS has acquired many functional enhancements which appear to make compatibility complex; currently at 1.2 • fundamental module environments are database and data communications environments • database environment features Database System, core of IMS/VS, with Database Recovery Control System and Database Surveyor Utility feature • data communications environment includes Data Communications feature, the Fast Path feature (gives IMS/VS transactional orientation), and the Multiple Systems Coupling feature (provides framework for distributed database); 2 environments together yield grander name that IBM prefers, IMS/VS Database/Data Communications (DB/DC) System • kernel system for IMS/VS basically batch-oriented; hierarchical physical file organization; each logical record equivalent to segment in physical file; upper limit to number of supported segments limited only by amount of available storage.

Structured Query Language/Data System (SQL/DS) • targeted for IBM 370/138 and up, 4300 Series, 30XX Series and for all compatible non-IBM hardware; intended as a complementary product to DL/1 DOS/VSE and not as direct replacement • IBM has not conquered bridging problem between DL/1 and SQL/DS statements, but DL/1, SQL/DL and even CICS can co-reside amicably in the same processor; DL/1 data files are accessible to SQL/DL but not vice-versa • SQL extract facility formats selected DL/1 data definitions into tabular structure that then supports SQL queries against data; utility also available to load DL/1 SAM files directly into SQL/DS tables; ISAM and VSAM files must be converted into SAM files before loading into SQL/DS tables • programs running under CICS can access DL/1 or SQL/DL data files separately or simultaneously; online facilities of SQL/DS implemented through special CICS/DOS/VS transaction • SQL/DS 1.2 is available to run under VSE/AF 1.2 and VM/SP 1.3; it supports CICS/DOS/VS 1.6, provides improved performance, and supports double-byte character set (for fixed, varying, and long graphics character type encodings).

Database 2 (DB2) • implementation of the relational model, built around the concept of a table space, which can consist of up to 64G bytes partitioned into up to 64 tables • database can consist of a virtually unlimited number of table spaces and databases • DDL (data definition language) and DML (data management language) functions are incorporated into a single language called SQL which includes the relational operators to interface users to the extraordinary query capabilities of the relational model; SQL statements can be embedded in applications written in COBOL, FORTRAN, PL/1, or assembler; DB2 strips out the SQL code through a precompiler, inserts a CALL, and then recombines the SQL functions at the object level • users can access DB2 concurrently through IMS/VS-DS, CICS/VS, and TSO batch or online and users running application programs under IMS/VS-DS or CICS/VS can access both DB2 and IMS databases • system security is established through user profiles that are maintained in the DB2 directory (an extended dictionary); data integrity is assured through automatic checkpoint backout/restart facilities for system failure; media failures are handled through image copies; applications failures are managed through thread recovery facilities • runs on any processor that supports MVS/SP 2.1.1 or MVS/SP 1.3; cannot be split among multiple processors but can be installed concurrently with IMS; requires approximately 12M bytes of main memory • software prerequisites in the MVS/XA environment are JES2 (5740-XC6) or JES3 (5665-291) 2.1, Data Facility Product (5665-284) 1.1, and MVS TSO Extensions (5665-285) 1.1 • corresponding MVS/370 prerequisites are JES2/JES3 (5740-XYS/5740-XYN) 1.0, DPF (same as MVS/XA), and TSO/E (same as MVS/XA) • available third quarter 1984.

Query Management Facility (QMF) • interactive interface to DB2 intended for nonprogrammers; provides the capabilities of SQL plus graphics and report preparation facilities • QMF can also be used in a VM environment for concurrent access to both DB2 and SQL/DS DBMSs • ad hoc query operations are supported in SQL or QBE (Query By Example); user interface further supported by a set of HELP panels and sample SQL queries • operates in the same MVS environments as DB2 and each user requires at least a 2M-byte region in MVS and about a 1.5M-byte virtual machine in VM • in addition to DB2, QMF requires the Interactive System Productivity Facility (ISPF; 5668-960) 1.1, the Graphical Data Display Manager (GDDM; 5648-XXH) 1.3 and System Modification Program (SMP) 1.4 • available for SQL/DS 1.2 (VM/SP) second quarter 1984 and third quarter 1984 for MVS environments.

Data Extract (DXT) • permits users to extract data from IMS, VSAM, or SAM files and to load the data into DB2 or SQL/DS DBMSs; users can interface with DXT interactively through menu-driven panels • extracted data can be sent to another processor by using JES2 or JES3 networking • runs in MVS and MVS/XA environments; requires the Data Facility Product (DFP; 5665-284) 1.1, TSO/E (5665-285) 1.1, and ISPF/PDF-MVS (5665-268) 1.1; virtual storage requirements vary between 1M bytes and 1.5M bytes depending on the operating phase • availability is second quarter 1984.

File Transfer Program • general-purpose cross-operating system program that allows an SNA network mode to copy and update data sets to or from another mode on the network; cross-operating systems supported include SSX/VSE, VSE/AF1/2, and VSE/SP1/2; also supports CMS user in transferring files to/from SNA networks • provides X.25 supported so files can be transmitted over packet-switched networks • now at Version 2 Release 2 level.

FTP 2.2 • available for SSX/VSE, VSE AF1, and VSE/SP1 September 1984 and for VSE/SP2 and VSE/AF2 April 1985:

$1,500/$1,125 initl $270/$200 mo $90/$144 serv

☐ Gateways to Other Networks

IBM provides the X.25 NCP Packet Switching Interface (NPSI) that provides a gateway into X.25 packet-switched networks. It conforms to CCITT X.25 Level 1 recommendation and is offered in Releases 1, 2, and 3. It requires 3705/3725 and ACF/NCP/VS program product software. IBM also offers a gateway on X.25 through a Series/1, although it is not generally considered an SNA product.

X.25 NPSI 1.1 • provides basic link to X.25 networks and features maximum packet length of 4092 characters and "Modulo 8" package that requires acknowledgement by receiving node after 8 packets before transmission node will continue sending data • functional equivalent to World Trade Packet Switching attachment • supports protocol conversion for non-SNA devices; cryptographic subsystem/access method products; SNA communication to selected SNA devices via X.25 networks and Network Interface Adapter (NIA); CICS/VS, IMS/VS, TSO, and NCCF products; and co-residence on 3705 with NTO (Network

 ©1984 Data Decisions

IBM SNA
System Network Architecture

Terminal Option) • runs under ACF/NCP/VS 1.2.1 and corequisite SCP, with ACF/TCAM 2.2/3 OS/VS or DOS/VSE.

X.25 NPSI 1.2 • supports subset of CCITT X.29 to allow communication with start/stop, TTY 33/35, and other terminals conforming to CCITT X.28 • user-written host application can manage X.25 control functions • at application level, user writes own packet assembly/disassembly (PAD) support for BSC or other protocol • supports Modulo 8 and 128 levels of packet numbering • supports X.25 diagnostic packet • runs under same software as 1.1.

X.25 NPSI 1.3 • allows interconnection of SNA nodes through X.25 networks • supports CCITT X.21 non-switched interface adapter as physical attachment to X.25 network • runs under ACF/NCP/VS R3 with ACF/TCAM V2 R3 (OS/VS only) and/or ACF/VTAM R3 under OS/VS or DOS/VSE, with appropriate corequisite SCP, processor, and memory features.

X.25 NPSI 1.3.2 • supports ACF/NCP 3.0 for the IBM 3705 connected to host running MVS or VSE operating system • X.25 NPSI 1.4.1 supports ACF/NCP 3.0 on 3725 only connected to MVS host • X.25 NPSI 1.4.2 supports ACF/NCP 4.0 (3725 only) connected to MVS or VSE host; supports all features of 1.4.1; in addition supports extended network addressing, 3725-initiated wrap test for X.25 links, and 3710 Network Controller • availability is November 1984 for 1.3.2 under MVS, December 1984 for 1.4.1 under MVS, third quarter 1985 for 1.4.2 under MVS, fourth quarter 1985 for 1.4.2 under VSE, and first quarter 1986 for 1.32 under VSE:

$770/$577 initl	$269/$202 mo	$40/$64 serv

RPS X.25/HDLC & X.25 Communications Support • licensed program for Series/1 • provides HDLC communication support HDLC support for full-duplex asynchronous balanced mode (ABM) defined by CCITT Recommendation X.25 LAPB procedure; full- and half-duplex normal response mode (NRM); multiple data links on a Series/1; unextended (Modulo 8) control formats; data link control procedures for link initiation, termination, data transfer, link-state control, and identification and error recovery; full-duplex point-to-point communication between stations; and full-duplex on point-to-point or multipoint link with Series/1 acting as either primary or secondary station • supports X.25 (1980); multiple permanent virtual circuits and multiple virtual calls; packet-level protocols; packet sizes of 32, 64, 128, 256, 512, and 1024 bytes; data segmentation/concatenation; access to carrier-supported optional features.

☐ Support for Foreign Terminals

The **Network Terminal Option (NTO)** allows non-SNA terminals access to SNA network by making the terminal appear as an SDLC 3767 communications terminal. TWX models 33/35 terminals can access TSO, VSPC, and CICS. World Trade TTY terminals can access TSO and CICS.

NTO also supports non-SNA IBM terminals such as the 2740 Model 1, 2741, 3101, and 3767 running in 2741 compatibility mode. See entry under Message Management section.

The **X.25 NCP Packet Switching Interface** 1.2 supports subset of X.29 for communication with asynchronous (start/stop) devices. User must write application program to support BSC packet assembly/disassembly (PAD). See Gateways to Other Networks section.

■ SECURITY

☐ System Security

In general, system security depends on management establishing security policy and access control rules, and then assigning responsibility for implementing them with products available from IBM or with user-developed products. Primary products for system security are RACF and VSE/ICCF. Secondary products for system security are Virtual System Personal Computing (VSPC) for personal computing, Programmed Cryptographic Facility (PCF) for TSO extended access control, MVS and VM/370 for user-to-user isolation, VSAM for access control, IMS/VS and DB2 for data and transaction access control, DPPX and DPCX on the 8100, and CICS for transaction access control.

Resource Access Control Facility (RACF) • see entry under Data Security.

Virtual Storage Extended/Interactive Computing & Control Facility (VSE/ICCF) • restricts users to authorized programs and data • operates in DOS/VSE environment • requires VSE/CICS for SDLC terminals; CICS requires BTAM-ES, ACF/VTAM R2, or ACF/VTAME.

☐ Data Security

Access restriction is through RACF or VSE/ICCF as described above. Primary products for file security and data security across communication lines are based on cryptographic subsystem that runs under OS/VS1 and MVS only. Both file and data communications encryption require either the 3848 Cryptographic Unit and Cryptographic Support Unit program or the Programmed Cryptographic Facility program. File encryption also requires Access Method Services Cryptographic Option or user application program control. Data encryption also requires ACF/VTAM Encrypt/Decrypt Feature or ACF/TCAM 2.0.

Cryptographic Subsystem supports end-to-end encryption so that the data is not available at intermediate hosts or nodes. Terminals on a cluster controller can use different keys. Session-level encryption allows encryption for only those applications that require it; frequent changes of the key are supported since its life is only for the length of a session.

Encrypt/Decrypt Feature ACF/VTAM & ACF/TCAM 2.0 • interfaces application to cryptographic program product; transparent to application program except when encryption is under its control; selects use of encryption on session basis, and generates and manages cryptographic keys • supports 3845/3846 Data Encryption Devices and Terminal Encrypt/Decrypt Features.

Resource Access Control Facility (RACF) • a data security and audit licensed program that provides functions to assist an installation in controlling user access to applications; permanent DASD data sets; tape and DASD volumes; CICS/VS and IMS/VS transactions and transaction groups; TCAM, VTAM, and BTAM terminals defined to TSO, CICS/VS, or IMS/VS; and user-defined resources and resource groups • extends security and auditability features in MVS and supplements security capabilities in CICS/VS, IMS/VS and Database 2 (DB2); DB2 supported by system authorization facility (SAF) in MVS • RACF 1.6 available March 1984, offers an Interactive System Productivity Facility (ISPF) menu and entry panels for RACF commands; grace period option to assist in an installation implementing a secure system in orderly fashion; Data Security Monitor, available third quarter 1984, to monitor security control mechanisms against established norms; and improvements to enhance performance and auditability • RACF 1.6 runs on all processors that support OS/VS2 3.8, MVS/SP 1.3 or 2.0.

3845/3846 Data Encryption Devices • provide encryption/decryption of data transmitted over data communications link for non-SNA systems or non-SNA links in SNA system • devices positioned between Data Terminal Equipment (DTE) and Data Communications Equipment (DCE or modem) on each line • handle S/S, BSC, and SDLC line protocols; operate half- or full-duplex at speeds up to 19,200 bps • conforms to U.S. National Bureau of Standards published standard.

Terminal Encrypt/Decrypt Feature • operates with 3274 Control Unit Models 1C and 51C; 3276 Control Unit Display System Models 11, 12, 13, and 14; 3776 Communication Terminal Models 3 and 4; and 3777 Communication Terminal Model 3 • provides hardware to encrypt data at terminal for communicating with a host that is running cryptographic support software; terminals with cryptographic feature can be multidropped with non-crypt terminals.

■ PHYSICAL NETWORK

☐ SNA Nodes

An SNA network consists of nodes connected together by data links. SNA has three classes of nodes: Host, NCP, and Peripheral Nodes; see Figure 2. A node has a path control element to route

 ©1984 Data Decisions

IBM SNA
System Network Architecture

data, as many data link control (DLC) elements as there are connections to adjacent nodes, and a physical unit (PU). A Boundary Function can also be part of a node. It translates global network addresses into logical addresses used by the local terminals and cluster controllers. This allows the changing of network addresses and system definitions without changing the physical devices themselves.

The DLC elements schedule transmissions, and the PUs activate and control the data links. End users are outside the node but gain access into the network through logical units (LUs) which act as ports. End users can be application programs, terminal operators, or peripheral devices; see Figure 3.

The PU includes a number of modules, including PU Session Network Services, Data Flow Control, and Transmission Control.

The LU includes modules similar to those found in a PU, including LU Session Network Services, End-User Services, Data Flow Control, and Transmission Control. The Presentation Services are those for the I/O device used in the transmission, such as a keyboard on input and printer on output.

Nodes are implemented with software modules (now termed by IBM as SNA product nodes) that are located within physical units. An SNA node may or may not contain an LU; usually contains one or more LUs.

There are 5 types of SNA nodes.

Types 1 & 2 • peripheral nodes with limited ability for addressing and routing; sources of data input and recipients of data output • depend on Type 4 and 5 nodes to provide boundary functions of translating local addresses to global network addresses, and to provide routing through the network • located in terminal cluster controllers or terminals.

Type 2.1 • nodes that can implement LU 6.2 protocol; currently include only System/36 and System/38; can operate cooperatively with another node to execute a transaction.

Type 4 • subarea node; can be source and sink for data, but also can perform general path functions; can operate as intermediary in routing by passing messages from one node to another; can perform adaptive routing within its portion of network • located in local or remote 3705/3725 front-end processors.

Type 5 • subarea host node; similar to Type 4, but also contains SSCP (System Services Control Point) • located in S/370-compatible hosts • subset of SSCP located in 8100 and other IBM systems when they act as hosts to terminals that operate as if they were directly connected to applications in S/370-compatible host.

IBM has not implemented SNA consistently throughout its products. Sometimes logic is in 1 unit, and other times split between 2 units. This is due partly to the evolutional development of SNA, and partly to the wide disparity between the complexities of different functions performed. Transferring data to a printer, for example, is very straightforward, but implementing a transaction processing subsystem is complex.

All SNA networks must have at least one host node. A host SNA node (Type 5) contains a System Services Control Point (SSCP), which is really the control center of the network. It connects network operator(s) to the PUs in the network, and coordinates

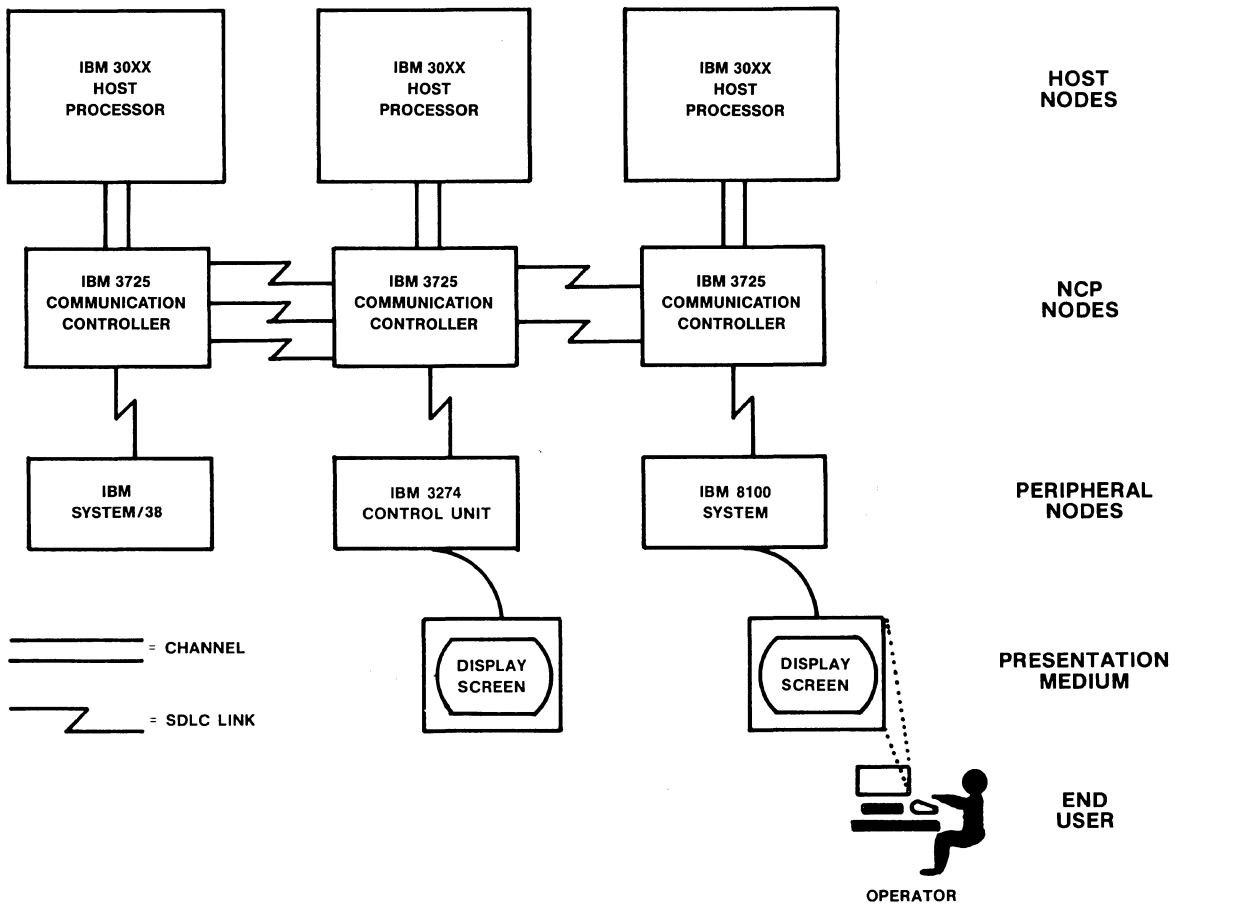


Figure 2 • sample SNA network hardware configuration.

 ©**1984 Data Decisions**

IBM SNA
System Network Architecture

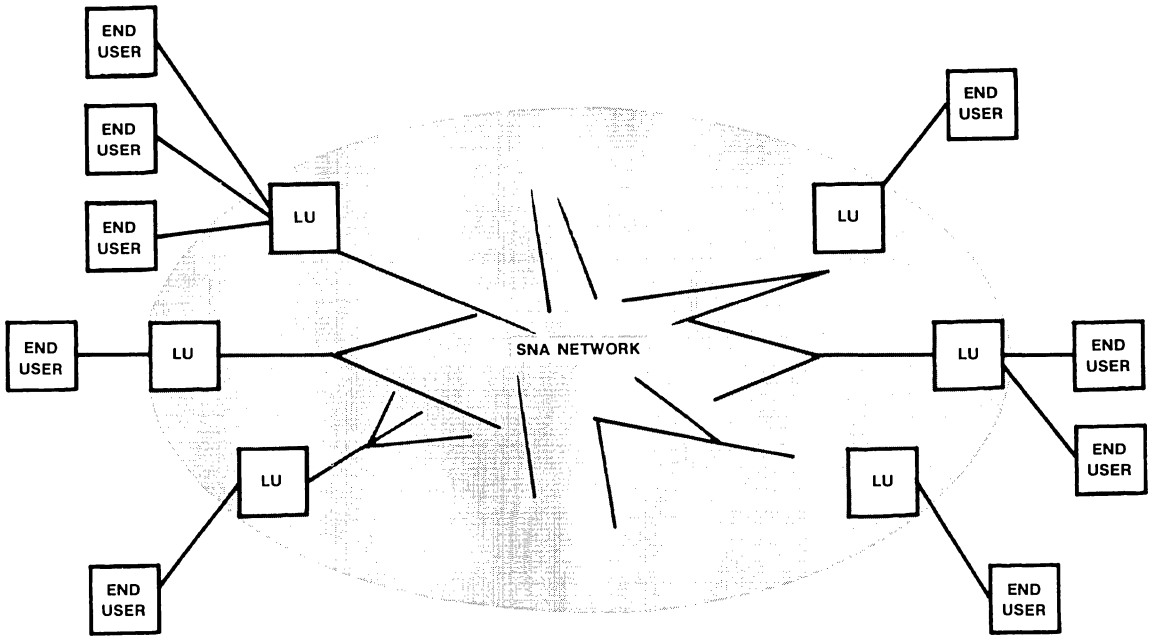


Figure 3 • Logical Units (LUs) interface end users to SNA network.

the setting up of sessions between LUs. A domain is defined as all the resources under control of an SSCP. SSCP resolves LU addresses so that network configuration changes are transparent to the users. It also allocates accesses to LUs that operate serially. The other SNA nodes contain a subset of SSCP called PUCP (Physical Unit Control Program).

The IBM S/36, S/38, DPCX, and DPPX 8100 systems, and VTAME on the 4300 can implement simple host nodes. SSCP is implemented within the access method (TCAM, VTAM, or VTAME) of the operating system. These systems can also implement other types of nodes. Full-blown SNA networks, however, require a S/370-compatible host that implements virtual memory and includes a front-end communications processor. The NCP (Network Control Program) in a 3705/3725 front end to a host node can handle more complicated configurations. NCP concentrates the traffic between the SDLC lines and the S/370-compatible host's data channel and offloads the data link control management functions from the host processor. An SNA network has three kinds of Network Addressable Units (NAUs): Logical Units (LUs), Physical Units (PUs), and SSCPs; see Figure 4.

Routes between NAUs are established as virtual routes. Multiple virtual routes can use the same physical route; see Figure 5. Virtual routes are assigned explicit routes for session transmissions. Alternate explicit routes can implement a virtual route, so that alternate routes can be used if a line fails or if a route becomes overloaded.

Global flow control regulates the traffic flow over transmission lines using virtual route pacing. It is regulated at the entry to the network and queues are established to provide orderly flow. Requests for transmissions are queued by priority. Transmission requests at the same priority are granted on a FIFO (First-In First-Out) basis.

FIFO queues are aged so that lower priority transmissions are honored within an acceptable time frame. Pacing responses and network messages are transmitted at the highest priority to ensure efficient line/network utilization. SNA users can request a particular kind of service: large bandwidth, low response time, secure paths, and reliable connections. Each class of service resolves to a list of virtual routes.

When a subarea node or transmission group fails and is detected by an adjacent node, it broadcasts the failure to each adjacent subarea node telling which explicit routes failed. It is propagated from node to node until it reaches the end points of explicit routes. The explicit routes are mapped to virtual routes and unbinds LU-to-LU sessions that are using the failed routes; see Figure 6.

When transmission errors occur, as detected through the check character in SDLC protocol, SNA has pause-and-retry logic to wait out temporary link failures. If an error is permanent, problem determination logic traces the virtual and explicit routes to determine which physical node has failed. Once the node is found, analysis of which network element is at fault begins: control unit, modem, line scanner, and so on.

SNA allows centralized network management. SSCPs can deliver unsolicited error data, but generally the Network Management uses a solicitation protocol to poll nodes to gather data.

☐ Session Control

Sessions between LUs on a network are made up of 2 half sessions. A session is created when one or LU (the Primary, usually a program in a host) sends a BIND request to another LU (the Secondary). Parameters in the request define the session according to the characteristics of the LUs and the user needs. SSCPs provide the session control.

There are at least 8 LU types: 0, 1, 2, 3, 4, 6, 6.2, and 7. The LU type parameter defines the behavior of the LUs with respect to each other. The LU interface is device independent; a primary LU that supports an LU Type 1 can, for example, support any number of secondary LU devices that implement the LU Type 1 interface. Some LUs can handle multiple sessions concurrently while others can handle sessions only one at a time in sequence. SNA devices implement pacing algorithms to prevent the sender from overloading the receiver. It is a 2-stage operation: pacing between the cluster controller or terminal and the boundary and between the boundary and the host.

LU Type 0 • supports all LU options; available for any defined LU functions.

LU Type 1 • appears to primary LU as keyboard-printer console with alternate destinations such as diskettes, punches and extra printers.

 ©1984 Data Decisions

IBM SNA
System Network Architecture

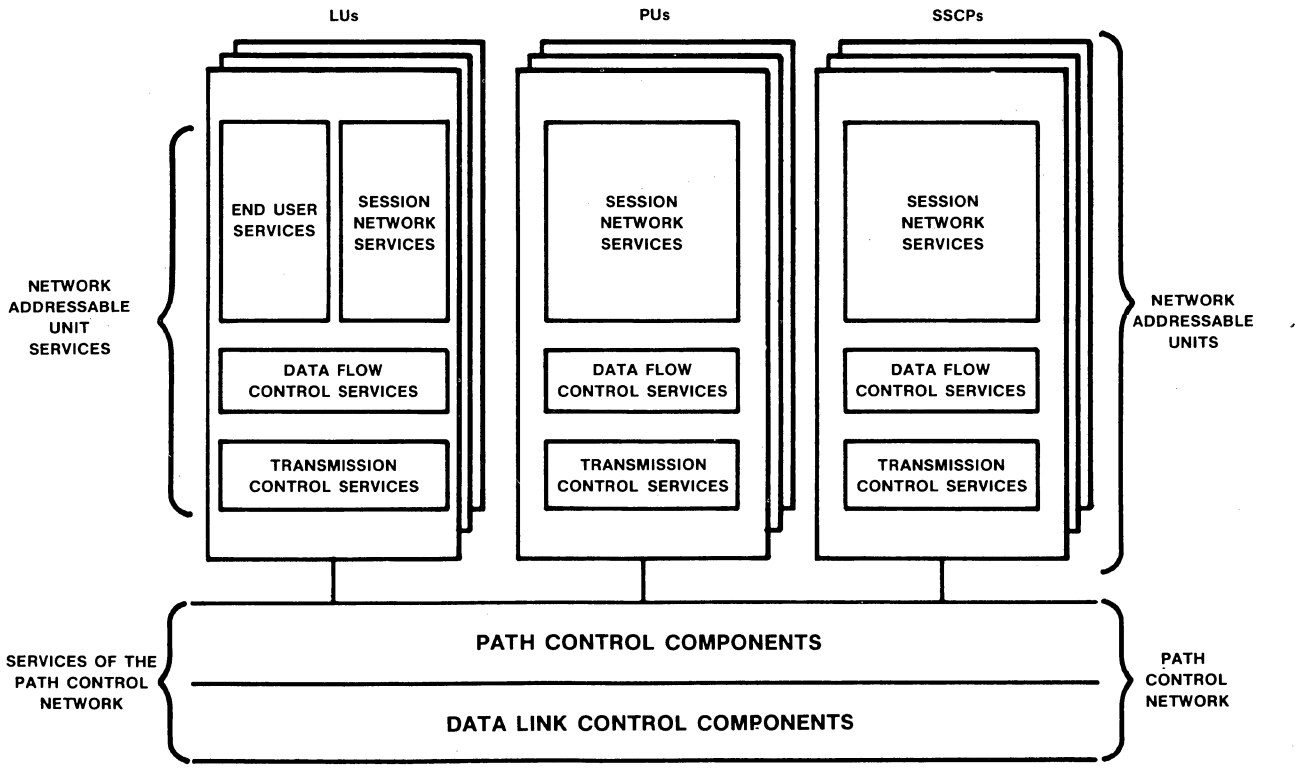


Figure 4 • distribution of services within SNA network.

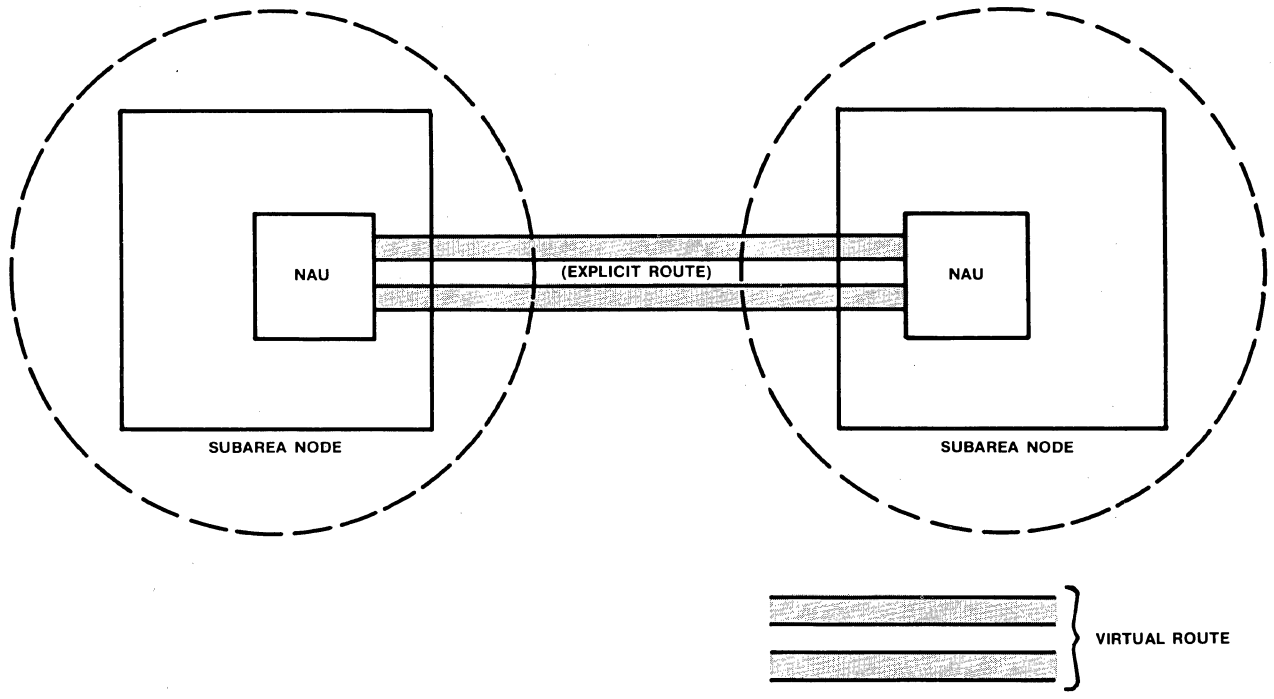


Figure 5 • multiple virtual routes share explicit route NAUs.

©**1984 Data Decisions**

IBM SNA
System Network Architecture

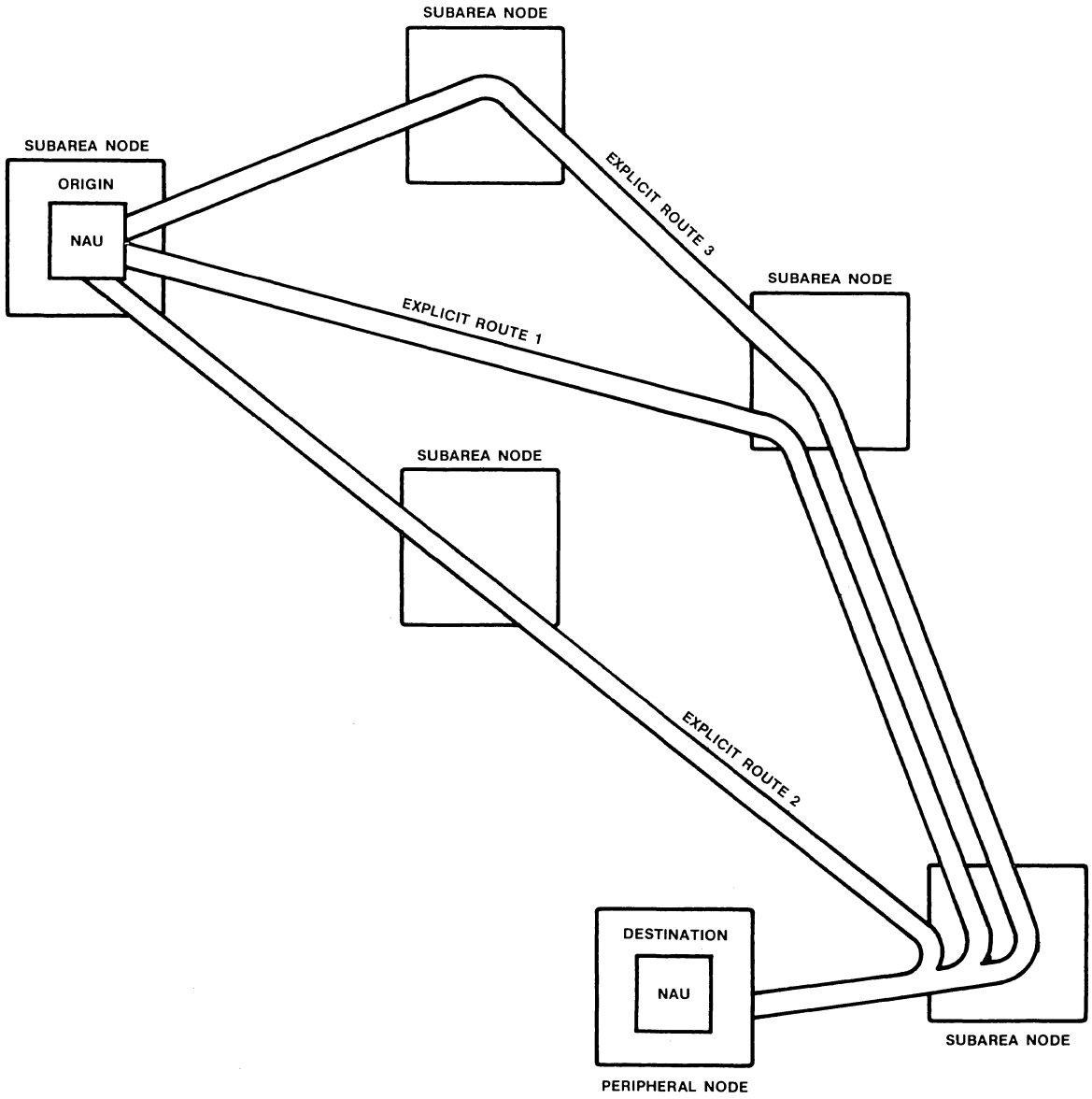


Figure 6 • multiple active routes between subarea nodes.

LU Type 2 • appears to primary LU as single display device using the basic 3270 SNA data stream • options supported are selector pen, extended screen size, screen size switching, display of lowercase alphabetical characters, and magnetic stripe reader • secondary LU Type 2 also has local copy option.

LU Type 3 • appears to primary LU as single printer using 3270 data stream • options supported include extended buffer size (480- or 1920-character buffer) and buffer size switching.

LU Type 4 • operates in peer-to-peer sessions as well as in primary LU/secondary LU sessions • in peer-to-peer sessions, each LU is responsible for its own recovery from error conditions; in primary LU/secondary LU sessions, the primary LU has responsibility for recovery from errors • used to manage I/O devices including printers, card readers and punches, storage devices, and an operator console for interactive I/O or diagnostic messages.

LU Type 6 • developed specifically to handle transaction processing applications which require coordination among many network elements • provides access to DL/1 and other databases for entrance to message queues, for sending system messages, and for scheduling program execution.

LU Type 6.2 • provides a connection or port between its transaction programs and network resources; each LU 6.2 makes a set of resources available to its transaction programs; the exact set is product and configuration dependent • examples of resources are processor machine cycles and main storage, files on magnetic disk or tape, input/output devices such as keyboard and display terminals, and logical resources such as sessions, queues, and database records • some resources are local to a program—attached to the same LU as the program; other resources are remote—attached to other LUs (remote is defined in logical terms, the LUs can be within the same physical node)

 ©1984 Data Decisions

IBM SNA
System Network Architecture

• central function is resource allocation and control; programs can request the LU for access to a resource; the LU schedules allocation to serially reusable resources, creating new copies of logical resources, such as sessions, when necessary • LU provides resource control in order to ensure integrity of the program's access to the resource, allowing the program to perform an operation on the resource only when the resource is in the appropriate state for that operation • LU may also provide other resource-related services to its programs, such as resource synchronization-point processing that synchronizes committed changes to resources • **protocol boundary** is the generic description of the transaction program's logical interface to an SNA network, from the perspective of the transaction program; LU 6.2 provides the protocol boundary between the program and the network • IBM products implementing LU 6.2 provide a programming interface that may differ in syntax from the protocol boundary but they are functionally equivalent • a **transaction program** is a program that is executed by or within LU 6.2 and performs services related to the processing of a transaction; it may process a transaction, be one of several programs that make up a transaction processing application, or it may be a system program that performs system services for an application program processing a transaction • **distributed processing** of a transaction within an SNA network occurs when transaction programs communicate by exchanging information over the sessions between their LUs, treating the session as a resource that is shared between the programs • Figure 7 illustrates the connection of 2 programs to SNA resources, including a session between their LUs; **other resources** shown in the figure may include other sessions as well as local files and devices; other sessions allow program A or program B to communicate with other programs • during the communication between 2 programs, one program may send a message over the session to another program, requesting access to a local resource of the other program; in this way, a local resource of program B, for example, may become a remote resource of program A • LU 6.2 provides interprogram communication; IBM products implementing LU 6.2 provide this service as **Advanced Program-to-Program Communication** (APPC), such as that provided for System/38 • interprogram communication permits distribution of the processing of a transaction among multiple programs within a network; programs coordinate distributed processing by exchanging control information or data; protocol boundary provides the structure for programs to communicate with one another in order to process a transaction • this structure meets the following requirements, in terms of their SNA realization: simultaneous activation of component programs; efficient allocation of interprogram communication resource/session (session sharing called a **conversation**); conversation overhead used efficiently; conversation lifetime determined by communicating programs; 2-way alternate data transfer (half-duplex); attention mechanism to handle asynchronous events; error notification of partner when detected; commitment control for error recovery; fully symmetric protocols for data transfers, attention, error notification and deallocation; mode of service named by program allocating the conversation; 2 levels of conversations (for systems and for applications programs); and subset definition by a base set and limited number of option sets.

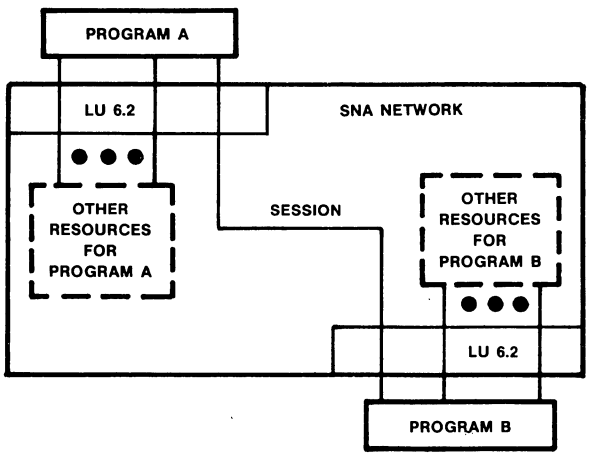


Figure 7 • transaction programs and SNA resources.

LU Type 7 • similar to Type 2 in that it appears as keyboard-display, but data stream differs.

☐ Network Control

IBM offers a number of products to provide operator control of a network for troubleshooting, reconfiguration, adding or deleting hardware or software to/from the network, and monitoring operations. The Network Communications Control Facility (NCCF) supersedes the Network Operation Support Program (NOSP) to centralize all network control options to allow an operator control over a network. The Network Problem Determination Application (NPDA) works with NCCF to provide assistance in troubleshooting. Other programs to aid in error handling are the Threshold Analysis and Remote Access (TARA) feature and Network Error Management Facility (NEMF). The Operator Communications Control Facility (OCCF) allows the system to be run from a remote NCCF terminal.

For systems with multiple S/370-compatible processors controlling several networks, SNA consolidates many of the communications management functions for all hosts at one site into one host processor. IBM calls this implementation of centralized control the Communications Management Configuration (CMC).

Network Communications Control Facility (NCCF) • fully supported as application program under ACF/VTAM 1.3, ACF/VTAME, and ACF/TCAM 2.0; Network Problem Determination Application (NPDA) portion supported by ACF/VTAM 1.1 and 1.2, TCAM 10, and ACF/TCAM 1.0 and above • centralizes network control operations to allow network operator at 3270 terminal to control the network; allows operator to give VTAM or TCAM commands, receive messages from the network, and collect, store and receive network error messages to support NPDA; can solicit summary maintenance statistics from SNA devices; can route communication error records to host data files; can operate as base of user-written network control system • enables remote operation of multiple systems from the NCCF terminal in conjunction with Operator Communications Control Facility (OCCF) • NCCF 2.0 provides a network operator with facilities to control single-domain, multiple-domain, and multiple-SNA-network environments • see Network Management section.

Network Problem Determination Application (NPDA) • application program running under NCCF to troubleshoot network from centralized 3270 operator terminal • collects, stores, displays and assigns probable cause of all specific errors reported from communications controllers, modems, lines, cluster controllers, control units, and terminals • coexists with the Display Exception Monitoring Facility (DEMF); alerts operator of excessive temporary line errors, provides traffic data from network components, and contains facilities to solicit summary maintenance statistics • allows cross-domain access to error files • see Network Management section.

Network Performance Monitor (NPM) • runs under MVS and MVS/XA; provides realtime monitoring of network and uses color graphics displays to present network status; enhances Network Performance Analyzer which was withdrawn September 1984; measures host response time and, in many environments, computes network response time.

Link Problem Determination Aid • feature of NPDA that runs on IBM 3860 Series modems to detect and diagnose link errors.

Threshold Analysis & Remote Access (TARA) Feature • runs under NPDA to support 3600 Finance Communication System to diagnose problems, collect performance data, and monitor remote operations • provides facilities for network operator control of 3600 system • See Network Management section.

Network Error Management Facility (NEMF) • field-developed program to collect and store in database information about

 ©**1984 Data Decisions**

IBM SNA
System Network Architecture

detected errors • runs as application transaction under CICS/VS.

Operator Communications Control Facility • designed to permit system to be operated from remote NCCF terminal • see Network Management section.

Communications Management Configuration (CMC) • centralizes communications management for multiple hosts at single site in one host and one front-end communications processor • CMC host processor is dedicated to management function; all hosts at CMC site share one ACF/NCP/VS program in front-end communications processor, and channel-connected to hosts through 3705 multiple channel attachment feature; CMC host activates and deactivates facilities, initiates and terminates sessions between logical units (LUs), and handles configuration changes • all network resources outside resources located in other host processors belong to access method in CMC host; other hosts at CMC site operate as applications processors, running under DOS/VS, OS/VS1 or MVS with either ACF/VTAM or ACF/TCAM with Multiple System Network Facility (MSNF) • entire configuration can be interconnected with other domains, and processing capability of host application processors available to LUs in other domains • CMC host can be any S/370-compatible processor that can function as host on any SNA network; if CMC host goes down, one of host application processors can take over its functions.

☐ Network Analysis

Network Performance Analyzer (NPA) • withdrawn and replaced by NPM • see Network Management section.

Network Performing Analysis Reporting System (NETPARS) • uses NPA data to produce reports for tuning and capacity planning; highlights areas of network with excess or inadequate capacity; requires NPA and GPAR (Generalized Performance Analysis Reporting) • replaced by NPM.

Generalized Performance Analysis Reporting (GPAR) • nucleus for family of IBM products that assist in performance analysis of hardware systems, system control programs, communications, and DB/DC systems • provides common user access to all GPAR-dependent reports, reads sequential input files, prints user-tailored graphs, and provides report program development aids • dependent programs include VTAM Performance Analysis Reporting System (VTAMPARS), IMS/VS Performance Analysis Reporting System (IMSPARS), IMS/VS performance analysis and tuning aid (IMSASAP II), CICS Performance Analysis Reporting System (CICSPARS), and Generalized Trace Facility Performance Analysis Reporting System (GTFPARS) • replaced by NPM.

☐ Network Problem & Change Management

IBM provides 2 products to manage network problems and changes in configuration. One is a program product and the other is a field-developed program; they overlap in function.

Information/Management Feature of the Information/System Release 2 • program product • integrates systems management applications programs for problem change and system-configuration management • network users, such as systems programmers, and network operators at NCCF or TSO terminal can gather problem information from other programs • contains EWS (Early Warning System) files, NPDA (Network Problem Determination Application), and IPCS (Interactive Problem Control System) products • maintains information on system inventory of hardware and software.

Account Network Management Program (ANMP) • field-developed program with 3 components—Problem Management Application, Change Management Application, and Network Configuration • Problem Management Application provides for online tracking and recording system of network problems; user can search on specific fields in database to obtain such things as a display of all problems not solved by a particular time or which problems have been assigned to a group for solution • Change Management Application automates change procedure with reviewers and approvers for each change; user can track change activities • Network Configuration Application provides online database of components in network, including network map, detail listing and record of changes; can also be used to evaluate future plans for network.

☐ Protocols

SNA can be viewed in many different ways. From the functional point of view, it consists of 2 layers—Network Addressable Unit (NAU) services and Path Control Network (PCN) services. NAU services are further subdivided into NAU Services Manager, Function Management Data (FMD) services, Data Flow Control, and Transmission Control layers. PCN services are subdivided into Path Control (PC) and Data Link Control (DLC) layers. Corresponding functional layers at each end of a data link communicate with each other. In addition, however, layers communicate with each other; see Figure 8.

The NAU Services Manager and FMD Services layers are concerned with providing a bridge between the network and the user. They are concerned with the way data is presented to the network from the user and vice versa.

The FMD Services layer communicates with the transmission subsystem which has responsibility for routing and moving data between its origin and destination. The transmission subsystem does nothing to the data itself, allowing the function management layer to provide services across all different kinds of physical links.

The application layer is where the user gets a job done. It is usually outside SNA since the user is responsible for programming it. The user, however, interfaces to the network through a terminal, an I/O device, or an application program. IBM now offers 3 application layer protocols for SNA for document/text processing: DIA, DCA, and GCD.

Document Interchange Architecture (DIA) • application-to-application protocol for electronic information interchange in an office environment • supports entering, editing, distributing, and printing/displaying information; designed to make interchanges easy, consistent, and accurate.

Document Content Architecture (DCA) • defines the format and protocols within a document for a revisable-form data stream and a final-form data stream for presentation.

Graphic Codepoint Definitions (GCD) • defines data processing and word processing graphic codepoints for presentation on printer/display.

The transmission subsystem functional elements are Transmission and Data Flow Control (corresponds to Session Control in ISO provisional model), Path Control, Data Link Control, and the Data Link. A Network Addressable Unit (NAU), which can be a Logical Unit (LU), Physical Unit (PU), or System Services Control Point (SSCP) generates a unit of data called a Request-Response Unit (RU) and presents it with associated parameters to the transmission subsystem.

It is the job of the transmission subsystem to set up a session with another NAU so the RU can be transmitted through the network and delivered to the appropriate NAU unchanged.

End User • operator at terminal, I/O device, or applications program • presents request for service to Presentation level; this provides the data needed to generate Request-Response Unit (RU) used as basis for communication throughout SNA network • end user deals only with Logical Units (LUs).

NAU Services Manager & Function Management Data Layers • together provide session presentation services, application-to-application services, and session network services.

Session Presentation Services • concerned with conversion of data format from end user at one end to correspond with format expected at other end • converts data according to logical unit (LU) types; for example, LU Type 1 appears as keyboard-printer console with various optional destinations such as diskette, punch or auxiliary printers, while LU Type 2 appears as single display using 3270 SNA data stream; other LU types available for other SNA units • passes converted data to transmission control.

 ©1984 Data Decisions

IBM SNA
System Network Architecture

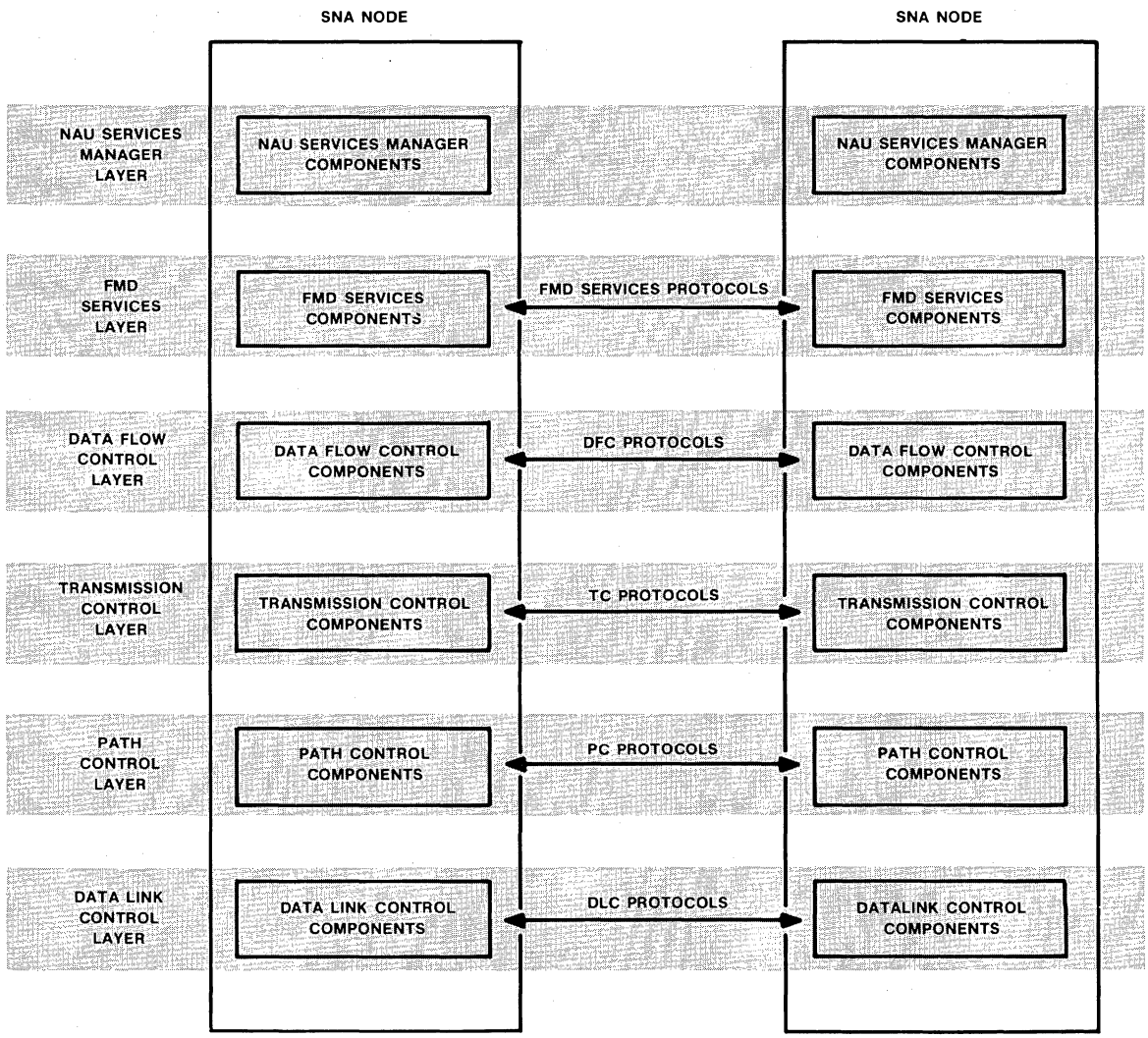


Figure 8 • intercommunicating layers through peer protocols.

Application-to-Application Services • SNA defines services for joining certain applications together without the applications being aware of the network protocols; these include interfaces between transaction processing systems such as CICS/VS in different nodes and programs accessing a database at another node • also synchronizes activities between 2 or more independent programs.

Session Network Services • located in system services control points (SSCPs), logical units (LUs), and physical units (PUs); include configuration services, network operator services, session services, and maintenance/management services.

Configuration Services • control network resources associated with physical network configuration; allow network operator to start up network, activate/deactivate links, and activate nodes • SSCP maintains tables with network names, addresses, and status of each link and NAU within the SSCP's domain.

Network Operator Services • interface operator to SSCP.

Session Services • controls sessions between 2 Network Addressable Units (NAUs), end points on network, and manages flow of data between them • consists of Connection Point (CP) manager, Session Control (SC), and Network Control (NC) elements which use Request-Response Unit (RU) as common unit for communication with each other • CP manager prefixes each RU received with Request-Response Header (RH) which contains parameters for transmission, to form Basic Information Unit (BIU); CP manager at other end of transmission decodes RH before delivering the RU • CP manager routes RU to its destination (by passing parameters to path control), checks and assigns received and transmitted BIU sequence numbers, coordinates responses wih requests, paces traffic, and responds to exceptions and sensed/monitored information • SC establishes transmission session and obtains resources required for its execution; also provides for handling catastrophic errors and reestablishing flow after error • NC provides means for CP manager and Path Control to communicate using common network without setting up separate session from NAU-to-NAU communication; this communication is at highest priority so that heavy network loading cannot prevent its transmission.

Maintenance & Management Services • allows SSCP to conduct tests on network links and nodes to isolate and diagnose failures; also allows SSCP to gather network statistics from nodes.

Data Flow Control Services • provides send/receive modes

 ©**1984 Data Decisions**

IBM SNA
System Network Architecture

of half- or full-duplex or half-duplex contention, chaining of related message units into a larger unit called a chain, bracketing of related messages that flow in both directions to keep related data separate from other unrelated data, response options for acknowledging receipt of data with indication of whether it is error-free or contains errors, and data flow control functions so end user can influence data flow between LUs without ending session.

Transmission Control Layer • tracks session status, paces data flow, and assures correct sequencing of messages during a session • session-level pacing allows session partners to adapt to different speed LUs; LU sends a fixed number of messages in a pacing group and waits for an acknowledgement before sending the next group; pacing group size and stages (1 or 2) depend on agreement made when session was initiated; single stage pacing is performed between LUs; 2-stage pacing is performed between origin LU node and receiving LU boundary (subarea) node, and between boundary node and receiving LU • constructs headers with control information and attaches them to messages • provides session-level cryptography for security.

Path Control • provides routing of transmission through network between network addresses • combined with SDLC elements, it forms common network used to route data units between transmission control elements • collectively, Path Control and Data Link Control make up shared Common Network which routes data units between Transmission Control elements • using parameters supplied by Transmission Control (such as sequence number) and internal routing data, Path Control generates Transmission Header (TH) that contains addressing, mapping, and sequencing data to attach to Basic Information Unit (BIU) prepared by Transmission Control to form Path Information Unit (PIU) • if BIU is too large to be transmitted as single element, Path Control will segment it, label segments and attach TH to each segment for transmission; if number of small BIUs are being transmitted over same route (which commonly occurs between host and communication processor), Path Control will block them together and attach TH to form single PIU for more efficient data transmission.

Data Link Control (DLC) • manages individual data link; elements are located at each node to manage all data links connected to node; protocols vary depending on type of link—S/370 data channel or SDLC transmission over common carrier facility • Basic Link Unit (BLU) is data unit transmitted over data link; DLC forms BLU by attaching link header and link trailer for control to Basic Transmission Unit (BTU) passed from Path Control to DLC • BLUs are passed over data links from one node to another; the link header and trailer are decoded at each node, and BTU passed to Path Control which decodes transmission header and determines if destination is located at node; if it is at node, BIU is passed to Transmission Control which processes Request-Response Header (RH), and passes Request-Response Unit (RU) to the appropriate NAU; if destination is at another node, Path Control on receiving side passes parameters to Path Control on outgoing data link to generate new TH to form new Path Information Unit (PIU) which is passed to appropriate DLC element • DLC generates new link header and link trailer to form new BLU for transmission.

Synchronous Data Link Control (SDLC) • component of DLC • provides control for transmission of data between nodes on network where node is addressable function represented by Physical Unit (PU) • bit-oriented discipline that assumes each transmission is between primary and secondary station, where primary station controls data link and issues commands, and secondary station receives commands and responds • all transmissions are contained in frame with same specific format—beginning Flag (F), Address (A) of secondary station, Control (C) field to specify purpose of transmission, optional Information (I) field containing information being transmitted, Frame Check Sequence (FCS) field containing check data required by receiving station to check accuracy of frame transmission, and ending Flag (F); F, A and C fields are 8 bits long; FCS field is 16 bits long; and optional I field is variable in length but always multiple of 8 bits • F field consists of 01111110 bit pattern; transmitting device inserts "0" after every 5-bit sequence transmitted to prevent natural sequence of bits from forming F field; conversely, receiving device recognizes 6 bits in row as F field, and zero after every 5-bit sequence as insertion to be ignored • this simplified explanation of SDLC ignores control commands that can be issued by primary station, and responses available to secondary station to establish transmission, its length, error checking, recovery procedures and so on • IBM claims SDLC as implemented in its products is operational subset of High-Level Data Link Control (HDLC) as defined by the ISO (International Organization for Standardization) • IBM implements SDLC protocol on non-switched communication lines in duplex and half-duplex mode for point-to-point and multipoint configurations, and on switched lines in half-duplex mode on point-to-point as well as loop configurations; the primary station on loop sends commands to any or all secondary stations on a loop; each secondary station decodes address field and acts as repeater station for all transmissions addressed to stations following it on loop; unidirectional transmission is always in half-duplex mode.

Physical • devices that interface to SNA network must be compatible with CCITT V.24 definition plus V.25 for auto-call units for telephone networks; CCITT X.21 for digital, point-to-point and multipoint, private line and circuit-switched services; and CCITT X.25 for packet-switched networks.

☐ Office Information Architectures

IBM's approach to the office environment is to develop a set of architectures that will allow a variety of devices implementing these architectures to function together in a single network. Users on the network will then have access to shared information and be able to interchange information with other users on the network. These architectures are part of SNA; they extend SNA into the higher level applications layer. All the other layers of SNA are used for the transmission system that performs all the functions associated with transmitting information around the networks and SNA Distribution Services (SNADS).

Three key architectures are defined: Document Content Architecture (DCA), Document Interchange Architecture (DIA), with DIA acting as the envelope that carries the letter defined by DCA, and SNADS controlling distribution of information and among systems in network.

DCA defines 2 format types for data streams: **Revisable-Form-Text DCA** and **Final-Form-Text DCA**. **Revisable-Form-Text** data streams contain formatting controls in addition to the text while Final-Form-Text data streams do not. The revisable format is designed to allow users receiving messages to change or add to (edit) the text and its format before it is presented in its final form.

Final-Form-Text is intended for presentation on a printer or display screen. Figure 9 shows the relationship between the 2 data streams.

The **Document Interchange Architecture (DIA)** defines a set of user services that are implemented in the applications layer of SNA. DIA specifies how the processes located throughout the network and performing the services communicate with one another. The categories of services are DIA Session Services, Document Library Services, Document Distribution Services, and Application Processing Services. The services are performed in response to DIA commands which are grouped into function sets that specify the scope of work for a DIA session.

The logical components of an office system network consist of source nodes, recipient nodes, and **office system nodes (OSN)**. The source node provides DIA services for an end user that initiates and controls the interchange of documents with recipient end users. A recipient node provides DIA services for a recipient end user that controls and receives documents/information sent by a source node. An OSN provides DIA services—receive, store, route, and deliver—messages/information—for source and recipient nodes. For example, OSN contains storage facilities so it can provide a document library for an attached source node. An OSN can interact with a network to distribute documents/information to another OSN.

The DIA data stream or **Document Inchange Unit (DIU)** is shown in Figure 10. The **prefix** introduces and identifies the data stream as a DIA unit. The **command sequence** contains the command

 ©1984 Data Decisions

IBM SNA
System Network Architecture

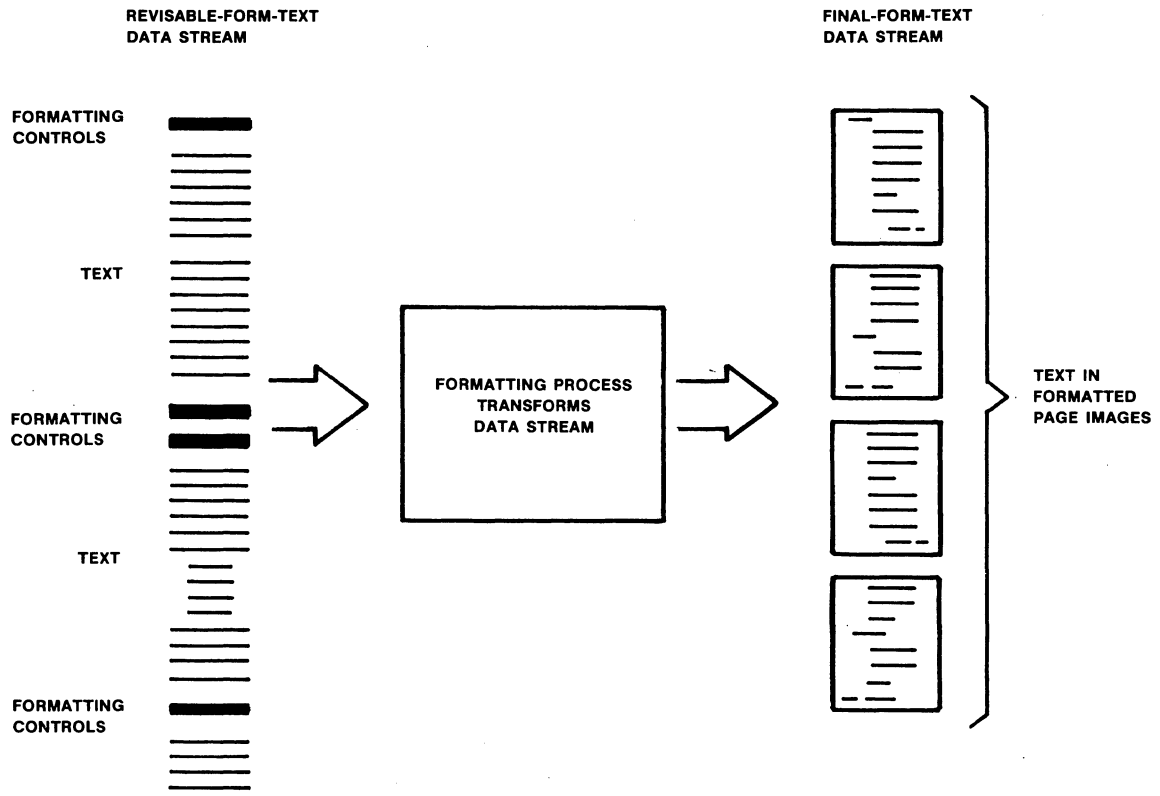


Figure 9 • relationship of revisable-form-text and final-form-text data streams.

to specify the function to be performed. The **data unit** field is optional and contains information that can be referred to by the command. The **document unit** is optional and contains the document profile and the document content (text and control codes) when it is sent from one DIA process to another. The **suffix** specifies the end of the DIU and indicates any abnormal conditions that occurred during transmission.

The DCA data stream, DIA data stream, and SNA message units are related as shown in Figure 11. An end user at a workstation creates a DCA data stream in revisable or fixed-form-text as the end user determines in conjunction with the workstation capabilities. The document distribution services in the workstation insert this data stream into a DIA document interchange unit, forming the DIA data stream. The presentation and transport services of SNA attach the SNA control information to DIU to form a message that can be routed through an SNA network. A fixed-form-text data stream could be in Graphic Codepoint Definitions (GCD) format for an output device that can interpret the code.

SNA Distribution Services (SNADS) provides an architecture for the distribution of information among systems in a multisystem network.

All of these architectures (SNA, DCA, DIA, and SNADS) are being implemented in IBM products.

PREFIX	COMMAND SEQUENCE	DATA UNIT	DOCUMENT UNIT	SUFFIX

Figure 10 • document interchange unit (DIU).

IBM has implemented its DIA interchange through its Distributed Office Support System (DISOSS)/370. DISOSS consists of a series of software products that support the interchange of documents among S/370 host systems running under MVS, MVS/XA, and VSE operating systems. IBM Displaywriters, 5520s, 8100, Distributed Office Support Facility (DOSF) Systems, PCs (with Displaywriter), and System/36.

IBM has indicated in statements of direction that DISOSS/370 will be extended to include interchanges with System/38, 8100 DPPX, Series 1, and PCs using the PC network.

Professional Office Systems (PROFS) is not an SNA products but it is the key VM office systems product to assist managers, professionals, secretaries, and support personnel in creating, communicating, retrieving, and job-related information. PROFS consists of VM/CMS-based applications programs that allow users to perform office functions on their interactive problem solving terminals. PROFS has full peer networking, although not using DIA architecture, among VM systems. PROFS also supports a personal Computer connection.

IBM provides gateways to PROFS from DISSOS/370. PROFS and DISOSS/370 networks can interchange final-form documents. IBM has stated it intends to provide full editable interchange between DISOSS/370 networks and PROFS networks.

IBM has announced peer-to-peer networks for S/36 and 5520 using SNADS as well as DISOSS/370. IBM intends to expand SNADS peer-to-peer distribution to include S/38, 8100 DPPX, and Series 1.

IBM has extended its support of the IBM PC by providing Personal Services/PC and DisplayWrite 1, 2, and 3 on the PC. Personal Services/PC is an office-oriented mail system. DisplayWrite is a text editor. System/36 operating as a host supports these PC

 ©1984 Data Decisions

IBM SNA
System Network Architecture

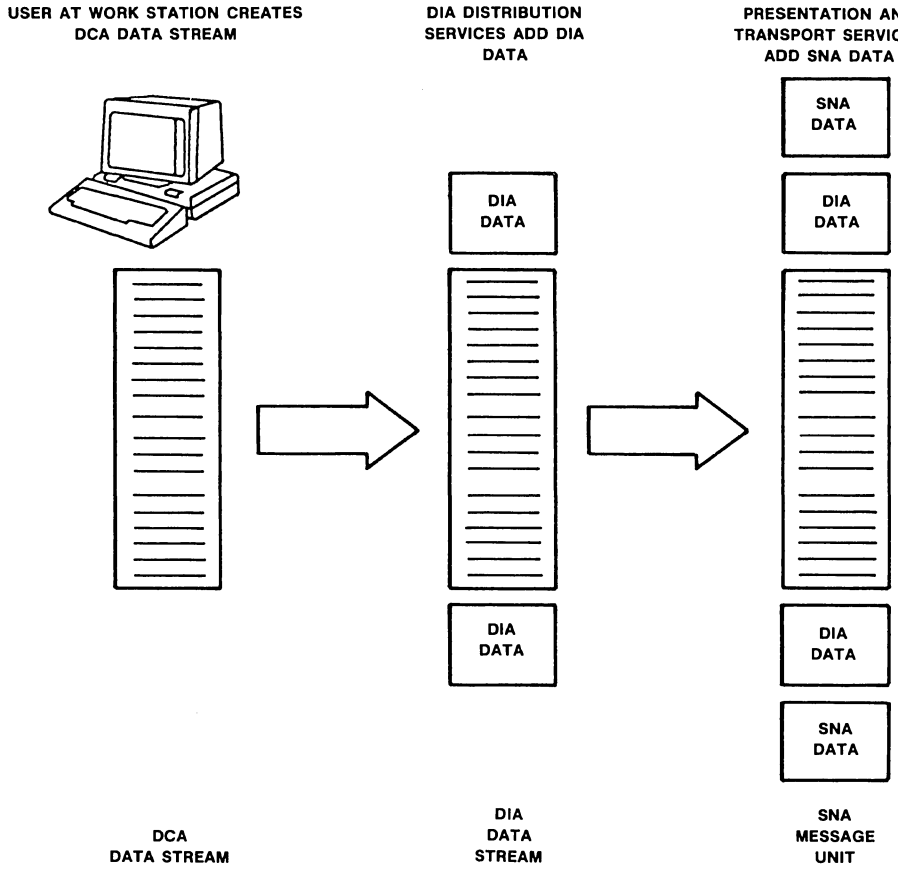


Figure 11 • relationship of DCA and DIA data streams and SNA message units.

functions. DisplayWrite/36 is a DCA text editor. Personal Services/36 are distribution services, mail handling, calendar, and so on for a network of PCs. Personal Services/370 provides mail and library support for general purpose displays on MVS and VSE systems under CICS. DISOSS/370 is used for distribution and library services. Intergrated Processing of Data and Text (IPDT) provides integration of data and text and automated correspondence.

Personal Services/PC • mail system; runs on IBM PC, Portable PC, PC/XT, PC/AT, 3270 PC; allows peer-to-peer communication between PCs directly providing automated mail system and electronic file cabinet:

NA/NA initl	NA/NA mo	NA/NA serv
$250 OTC		

DisplayWrite 3 • advanced function text processor; runs on IBM PC, Portable PC, PC/XT, PC/AT, and 3270 PC:

NA/NA	NA/NA	NA/NA
200		

PROFS PC Connection (PROFS/PC2) • extends selected PROFS functions to PCs • requires DOS 2.0, 2.1, 3.0; DisplayWrite 3 and PROFS to IBM 5520 file transfer supported; runs on IBM PC, Portable PC, PC/XT, PC/AT, and 3270-PC:

NA/NA	NA/NA	NA/NA
$200 OTC		

IBM Personal Services/370 • includes electronic preparation storage, retrieval, and dissemination of messages and office correspondence within a DISSOSS/370 systems; extends and replaces the DISOSS/Professional Support Program • documents created using personal Services/370 are distributedd using final-form text DCA • supports file transfers with 3270-PCs:

Under MVS or MVS/XA:

2,250/1,688	750/563	120/192

Under VSE:

1,050/788	350/263	90/144

IBM 8100 Distributed Office Support Facility (DOSF) 5.0 • allows users to edit DOSF documents on advanced function 3270 terminal; dialog manager menu-creation facility helps users customize the system interface • available March 1985:

12,300/10,455	704/598	99/157

8100/DOSF 5.0 • runs under DPCX; provides cluster controller support for IBM PCs; provides editing capability of DOSF documents on advanced function 3270 terminals and ability to view and annotate DOSF documents on all display terminals:

12,300/10,455	704/598	99/157

■ EQUIPMENT SUMMARY

☐ Host Computers

IBM System 370/138 & Upward • no longer marketed and generally replaced by 303X and 4300 systems.

IBM 303X Processors • all essentially superseded by 43XX and 308X models.

IBM 3081 Processor Complex • S/370-compatible processor rated at about 10 MIPS • includes 2 identical **dyadic** processors that share from 16M to 48M bytes of common memory but each

 ©1984 Data Decisions

IBM SNA
System Network Architecture

has its own set of I/O channels; cache memory is 32K bytes on 3081D/G and 64K bytes on 3081K • similar to AP and MP systems except channels can be assigned to either processor • includes 3081D, 3081G, 3081GX, 3081K, and 3081KX models; 3081D has been replaced by 3081G which offers more performance than the 3081D at the same price • performance range is about 10 MIPS for 3081G, 11.0 MIPS for 3081GX, 14 MIPS for 3081K, and 16.0 MIPS for 3081KX • runs under MVS in S/370 or XA mode, under VM in 370 mode, and under VM/XA Migration Aid in XA mode; the VM/XA Migration Aid is really an umbrella operating system supporting MVS/SP migration to MVS/XA concurrently with MVS/SP and/or VM/SP production runs; note that MVS/SP, MVS/XA, and/or VM/SP run under VM/XA Migration Aid in this combination environment • can also run under OS/VS1/BPE (Basic Programming Extensions) and DOS/VSE.

IBM 3083 Computer Systems • essentially a single-processor version of the 3081K with performance levels; 3083C entry level system at about 3.0 MIPS, 3083E at 3.9 MIPS, 3083B at 5.9 MIPS, 3083-BX at 6.3 MIPS, 3083J at 7.8 MIPS, and 3083-JX at 8.4 MIPS • all models use 4K storage protect keys, implement the XA (31-bit addressing) architecture, all models except 3083C are upgradeable to 3081K, 3083C is upgradable to 3083E • provides memory capacity range from 8M to 32M bytes • run under MVS/SP in either S/370 or XA mode, VM/SP in 370 mode, and VM/XA Migration Aid.

IBM 3084 Computer System • most powerful processor IBM has ever announced; a dual-processor version of 3081K (which in turn is a dual-processor version of 3083J) making it a quad processor sharing from 32M to 96M bytes of memory; includes 32K-byte cache memory on each processor; performance rating of about 26 MIPS per 3084Q, and 28 MIPS per 3084QX per system • 3084Q available only as 3081K upgrade; 3084QX available as separate system • supported in single image mode by MVS/SP Version 2 and in partitioned mode by MVS/SP Version 2, VM/XA Migration Aid, and VM/SP High Performance Option 2.5 and above.

IBM 4321 Computer System • basically replaced by IBM 4361 Model 3.

IBM 4331 Computer System • basically replaced by IBM 4361 Model 3.

IBM 4341 Computer System • basically replaced by IBM 4361 Models 4 and 5.

IBM 4361 Computer System • available models 3, 4, and 5 that differ in amount of main memory, amount of cache memory, number of I/O channels, aggregate I/O data rate and performance • have scientific instructions, hardware floating-point unit, and performance enhancements for scientific and engineering applications • Model 3 supports 2M/4M bytes of memory while both Models 4 and 5 support 2M to 12M bytes of memory; all support the integrated communication adapter also available with the 4321 and 4331 to allow system to support communications lines without a 3705/3725 front end; Model 3 supports 3 and Models 4 and 5 support up to 4 integrated adapters to connect both disk and 8809 magnetic tape drives; all can also connect up to 2 local loop adapters and up to 2 data link adapters to connect up to 4 remote loops each • Model 4361-3 replaces the 4321, 4331-2, and 4331-1; provides about the same power as 4331-2 (0.42 MIPS) for commercial applications and 1.4 to 2.2 times performance of 4331-2 for engineering/scientific applications; uses same CPU as 4361-4 and 4361-5 but without cache memory • 4361-4 has 8K-byte cache memory; can connect 1 to 4 multiplexer channels, 2 of which can be high-speed 3M-byte-per-second channels; maximum aggregate I/O data rate is 10M bytes per second; performance rating is about 1.0 MIPS • 4361-5 has 16K-byte cache memory; can connect 3 to 6 multiplexer channels, 3 of which can be high-speed 3M-byte-per-second channels; maximum aggregate I/O data rate is 11M bytes per second; performance rating is about 1.3 MIPS • Models 4 and 5 run under SSX/VSE 1.3 DOS/VSE 1.1, OS/VS 1.7, and VM/SP 1.2 or 1.3; Model 5 can also run under MVS/370 1.3.8 • along with Model 3, IBM announced an optional Work Station Adapter (WSA) that can connect up to 32 local devices: supports same devices as a 3274 control unit as well as devices that connect through Serial OEM (SOEM) interface • when WSA is implemented, the number of ports on the integral Display Port Adapter is reduced from 16 to 8, thus up to 40 local devices can be attached through DPA and WSA • SSX/VSE 1.4 is required to support 4361 Model 3 and WSA • see Report 950-I048-4300 for details.

IBM 4381 Computer System • available in 3 models that differ in amount of cache for 2K-/4K-byte pages, number of processors, and performance; 4381-1 includes 4K-byte cache for 2K-byte pages and 8K-byte cache for 4K-byte pages; 4381-2 includes 16K-byte cache for 2K-byte pages and 32K-byte cache for 4K-byte pages, 4381-3 includes 2 4381-2 processors • 4381-1 performance rating is about 2.3 MIPS, 4381-2 performance rating is about 3.0 MIPS and 4381-3 performance is about 5.1 MIPS • 4381-1 include 4M to 16M and 4381-24M to 32M bytes of main memory; each can connect from 6 to 12 multiplexer channels, 4 of which can be high-speed 3M-byte-per-second channels, 3 can be 2M-byte-per-second channels, and 4 can be 1M-byte-per-second channels; maximum aggregate I/O data rate is 22M bytes per second • 4381-3 provides 2 processors, 2 32K-byte cache memory, 8M/16M/24M/32M-byte shared main memory, 12 standard and 8 optional channels equally divided between processors (8 standard channels are 3M bytes/second data streaming channels), and maximum aggregate data rate of 32M bytes/second • can run under all of IBM's operating systems for large mainframes; MVS/XA and VM; DOS/VSE supported only as guest under VM/370 • see Report 950-I048-4300 for details.

☐ Communications Processors

IBM uses its programmable communications controllers as local and remote front ends for host computers. Remote front ends are concentrators; they function as intermediate (subarea) nodes on SNA networks. Only the IBM 3705-II, 3705-80, and 3725 models can support full-blown SNA networks because the ACF/NCP/VS software requires 256K bytes of memory to run; the 3704 memory is too small. The 3705-I is no longer marketed. The NCP software in the communications processor combined with the access method in the host functions as the network operating system. IBM has stated that ACF/NCP Version 3 is the last update for the 3705.

IBM 3705-II Communications Controller • operates as local or remote front end for IBM S/370-compatible host • supports up to 352 half-duplex 9600-bps lines; maximum line rate of 230K bps • supports up to 4 channel-attached host processors simultaneously; manual 2-way switch can connect each 3705-II channel adapter to 2 host channels which can be on same or different processor(s); can connect up to 8 hosts but to only 4 simultaneously; connects to byte or block multiplexer channel of host processor; can connect to selector channel of some older S/370 models • supports up to 44 local terminal subsystems using start/stop or synchronous attachments • memory to support SNA network ranges from 256K to 512K bytes • runs under ACF/NCP/VS and supports either PEP or EP; PEP and EP provide upward compatibility with older hard-wired 270X data adapters • last release of NCP for 3705 is ACF/NCP 3.0 • see full report 950-I048-3705.

IBM 3705-80 Communications Controller • operates as local or remote front end for S/370-compatible host • all models include 256K bytes of memory • supports 4, 10, or 16 line attachments depending on model selected; any line attachment can connect to external modem or directly to device • direct device attachment is through EIA RS-232C/CCITT V.24 or CCITT V.35 connection; V.24 supports start/stop, BSC or SDLC protocols at up to 2400 bps; high-speed option allows transmission at 14.4K or 57.6K bps; V.35 supports 2 half-duplex synchronous devices with transmission at 14.4K or 57.8K bps; direct attachment of terminals at 3600/7200 bps or 4800/9600 bps available by RPQ • supports single channel adapter connection to byte multiplexer channel of S/370-compatible host, or 2 channel adapter connections to a byte or block multiplexer channel or selector channel; manual 2-channel switch option allows connection of channel adapter to 2 host channels located on same processor or on different processors • runs under ACF/NCP/VS; supports PEP or EP; PEP and EP provide upward compatibility with older hard-wired 270X data adapters • last release of NCP for 3705 is ACF/NCP 3.0 • see full report 950-I048-3705.

 ©1984 Data Decisions

IBM SNA
System Network Architecture

IBM 3710 Network Controller • operates as a network concentrator for up to 31 lines using mixed protocols; can connect a total of 32 upsteam and downstream lines; selected start/stop or BSC and SDLC lines can be concentrated onto one or more upstream X.25 and/or SNA/SDLC links; selected non-SNA (BSC/RJE) devices can be attached, supported through enveloping, similar to that provided by NTO • line speeds can range from 110 to 64K bps; interfaces are CCITT V.24, V.35, and X.21 • attaches to one or more hosts through the IBM 3705/3725 running under ACF/NCP; only the 3725 supports X.25 links to the 3710; can be multidropped with other SNA devices on a data link, and it supports Modulo 128 transmissions on SNA/SDLC upstream and downstream links • appears to SNA as a cluster controller, Physical Unit (PU)2 on point-to-point or multidropped SDLC links; supports full-screen IBM 3270 protocol conversion through an attached IBM 7426 Terminal Interface Unit Model 2; in the future, IBM intends to provide this facility internal to the 3710 without using a 7426 • extends LPDA modem diagnostic functions from the IBM 3705/3725 to the network downstream from the 3710 when the IBM 386X modems are used • currently, only the 3710 Model 1 is available; includes a base frame/enclosure, diskette unit, control unit including 384K bytes of storage, power unit, a dual RS-232C/CCITT V.24 communication adapter (called service adapter), and an integral 1200-bps, half-duplex, asynchronous, auto-answer modem; one 129K-byte memory expansion feature can be installed in the 3710 for a total memory of 512K bytes; up to 15 communication adapter features can be attached, including any mix of 7001, 7005, or 7010 adapters • 7001 adapter can attach up to 2 V.24 DCEs controlling communication lines, 2 V.24 DTEs, or one of each; lines/devices attaching to the 7001 must use the same link-level protocol • 7005 adapter can attach one DCE controlling a V.35 DCE/DTE • 7010 adapter can attach a nonswitched X.21 DCE device • supported by software operating with MVS or MVS/XA systems • scheduled to be available in the second quarter 1985 • see Report 950-I048-3710 for details.

IBM 3725 Communications Controller • programmable communications controller that is not software compatible with earlier 3705 models but can coreside compatibly on SNA networks with 3705 systems running ACF/NCP Version 2 or above; so far, 3725 software parallels 3705 software products • perform the same functions in SNA network as 3705 systems: operate as local and remote front-end processors for host systems; function as subarea nodal processors on SNA • available in 2 models: Model 1 includes 512K to 2M bytes of memory and supports up to 256 half- or full-duplex lines; Model 2 includes 512K to 2M bytes of memory and supports up to 80 half- or full-duplex lines; line speeds for both systems range from 50 to 230.4K bps and interfaces are available for BSC, SDLC, and start/stop asynchronous transmission with auto-call; 3726 Expansion Controller for Modle 1 can support one 1.544M-bps line • Model 1 can attach to up to 8 S/370-compatible host system channels and 6 can operate concurrently; Model 2 can attach to up to 4 S/370-compatible host system channels and 2 can operate concurrently • each 3725 consists of a central control unit (CCU), main storage, transmission subsystem (TSS), maintenance and operator subsystem (MOSS); MOSS includes IPL and utility procedures for 3725 implemented with independent processor with microcode, diskette drive, and operator console attachment for the 3727 Operator Console, which is required for maintenance • TSS includes line attachment bases (LABs) with microprocessor-based scanners, line interface couplers (LICs), and optional internal clock control (ICC) units; does not provide any integrated modems but compatible with IBM 3863, 3864, 3865, 3872, and 3874 modems and 3867 Link Diagnostic Unit • runs under ACF/NCP Version 2 or above for 3725 or EP/3725 or both running concurrently in Partitioned Emulation Program (PEP) mode, generated and loaded from S/370-compatible host operating in DOS/VS or OS/VS environment; requires ACF/VTAM V1R3 or above (MVS only), ACF/VTAM Version 2 or above, or ACF/TCAM V2R2 or above access method for host communications; requires ACF/System Support Program (ACF/SSP) Version 2 Release 1.1 or above running on host system for program development • ACF/NCP R3 for 3725 requires ACF/VTAM V2R2 • current version is ACF/NCP 4.0, which works with ACF/VTAM 3.0 or host • see full report 950-I048-3725.

☐ Distributed Computers

IBM 4361 Computer System • as distributed processing system, will generally run under SSX/VSE and include integrated communications adapter rather than 3705/3725 front-end processor • see description under Host Computers section and full report 950-I048-4300.

Series/1 • supported as SNA-SDLC station by front-end communications processor; can function as independent processing system, or as local peer-to-peer network of up to 16 processors; communicates with IBM S/370-compatible host as RJE terminal or as 3270 interactive terminal • supports 2780/3780 terminals and provides pass-through facility to a host computer • also has a GET/PUT interface to IMS/VS and CICS/VS applications programs in host • can operate as front-end processor for S/38; can attach to S/370-compatible system channel directly • supports X.25/HDLC communications under EDX operating system; PRPQ available to support IBM Personal Computer XT under DOS V.2 as intelligent workstation under both EDX and RPS; supports X.21 circuit-switched public data networks; can perform dynamic network definition and dynamic device generation for SNA network support • supports 3101 (TTY 33 compatible) terminals making them appear as 3270 terminals to host • can attach up to 128 local workstations; can terminate 24 lines in basic system and up to 24 lines in each of 6 I/O expansion chassis • available in 4 basic models: 4952, 4954, 4955, and 4956 with performance range of 0.05 (4952), 0.1 (4954), 0.23 (4955), and 0.28 (4956) MIPS • memory capacity is up to 128K bytes (4952), 256K bytes (4954), 512K bytes (4955), and 1M bytes (4956) • see full report 950-I048-0001.

System/23 Datamaster (5322) • single-user system based on 8-bit Intel 8085 microprocessor; submodels available with and without word processing firmware; replaces 5110/5120 and System/32 as entry-level system to IBM small business computers; single task system oriented toward interactive processing but can also perform batch processing • memory capacity up to 128K-byte RAM and 112K-byte ROM; diskette storage up to 4.4M bytes on single processor configuration with 6.6M bytes on dual-system configurations • only programming language is BASIC, a subset of System/34 BASIC • supports asynchronous and BSC communication; implements IBM 3741 BSC protocol for communication with other IBM computers • performance rating below that of IBM's Personal Computer.

System/36 • replacement system for System/34 with greater power and lower price for comparable configurations • SSP operating system upward compatible with SSP on System/34; runs virtually all of S/34 programs and supports virtually all of S/34 peripherals and terminals • 8-bit multimicroprocessor architecture with 16-bit wide data paths; memory capacity range is from 256K to 512K bytes • can support up to 30 local display and printer terminals and up to 64 remote displays on 4 communication lines • supports BSC and SNA/SDLC communication protocols at data rates up to 56K bps; can interface to X.21 circuit-switched networks • optional features include MSRJE feature for up to 7 RJE workstation sessions, interactive communication facility, and emulation of 3271-2 controller with 3277/3288 terminals for BSC communication with host or as 3274-1C with 3277/3288 terminals for SDLC communication with host for S/36 with 5250 terminals attached.

System/38 • operates as independent processing system with up to 120 workstations; communicates with S/370-compatible host as BSC or SNA-SDLC 3770 terminal; communicates with other IBM computers via BSC protocol • will eventually be supported as SRJE, MRJE, and BSC multiport tributary connection terminal to S/370-compatible host • implements LU 6.2 for peer-to-peer communication with host processor for performing transaction • 32-bit processor includes 5 processor models with 768K to 1.5M bytes (Model 3), 512K to 2M bytes (Models 4 and 5) 2M to 4M bytes (Model 7), or 4M to 8M bytes Model 8; all support 8 communication lines and 7 local workstation controllers for 116 to 128 interactive workstations • see full report 950-I048-0038.

IBM Personal Computer jr (4860 Models 4 and 67) • announced in November 1983, for delivery first quarter 1984; PCjr was designed for home, classroom, and office use; available

 ©1984 Data Decisions

IBM SNA
System Network Architecture

in 2 configurations that run under the DOS 2.1 operating system • purchase price is $669 for 4860 Model 4 with CPU, 64K-byte RAM, keyboard, desktop transformer, 2 ROM cartridge slots and audio tone generator and $1,269 for 4860 Model 67 with same components as Model 4 plus 64K bytes of RAM, 360K-byte diskette drive, and capability to display up to 80 characters • purchase price is $175 for an IBM PC Compact Printer and $1,995 for an IBM PC Color Printer • can operate in PC cluster and on PC Network with other IBM PCs.

IBM Personal Computer (5150) • single-user interactive/batch processing system for use in standalone configurations or as a 3270 interactive terminal or a 3770 batch RJE terminal to a S/370-compatible host; to host, the 5150 appears to be a 3274 Model 51C controller with a 3278 Model 2 terminal attached • the 5150 can also emulate a TTY ASR 33/35 for use with any host supporting those terminals; using TTY protocol, 2 5150s can communicate with each other for file transfers • built around an Intel 8088 processor and up to 640K bytes of main memory • math coprocessor for high-speed floating-point arithmetic and trigometric function calculations • BASIC compiler implemented in ROM; runs under IBM PC DOS PC, CP/M-86, and USCD operating systems; CP/M-86 allows system to run all the software developed for that popular operating system; Pascal and FORTRAN run under USCD operating system.

IBM Personal Computer/XT (5160) • extended version of the PC, available in one packaged system with software/hardware options; otherwise same as PC except includes 8 I/O slots rather than the 5 slots included with PC • a 2-card XT/370 option kit with VM/PC 1.1 for the 5160 supports local S/370 CMS session, Host 3278/79 session via an optional 3278/79 Emulation Adapter, Remote 3101 session and S/370 Processor Control Session, execution of unaltered host S/370 VM/CMS programs, and further expansion with 5161 Expansion Unit Model 2 • performance identical to XT/370 PC • VM/PC 1.1 requires DOS 2.1 or 3.0 or equivalent.

IBM Personal Computer/XT/370 (5160) • includes the 256K-byte PC XT board, the PC XT/370 processor card, the XT/370 512K-byte memory card, XT/370 3277 emulation card, double-sided diskette drive (up to 360K bytes), 10M-byte fixed disk, 8 system expansion slots, expansion unit adapter, BASIC language interpreter in ROM, automatic power-on self-test, and integral speakers • operates in PC or S/370 mode: in PC mode, operates like PC/XT; in S/370 (native) mode, executes S/370 fixed and floating-point instructions at about half the performance of IBM 4321 or 0.1 MIPS for commercial applications and twice that of IBM 4321 for scientific applications or 0.4 MIPS • 3277 emulation card attaches PC XT/370 to a local or remote 3274 control; optionally supports asynchronous communication through 3101 emulation; BSC and SDLC adapters are available but unsupported by software • runs under DOS Version 2 in PC mode and under VM/PC (based on VW/SE) in native mode; in native mode, can run many of the S/370 VM/CMS application programs.

IBM Personal Computer/Advanced Technology (5170 Models 068 and 099) • PC/AT (Popcom) announced August 1984; provides top-of-the-line model for PC-DOS environment and the beginning of a new multiuser XENIX product line • available in 2 versions: 5170-068 basic configuration suitable for diskette-based DOS systems and 5170-099 enhanced configuration which can run in either PC-DOS or XENIX environment and supports up to 3 users • purchase price is $3,995 for 5170-068 with 256K-byte memory, 1.2M-byte diskette drive and adapter, and 7 expansion slots; $5,795 for 5170-099 with 512K-byte memory, 20M-byte fixed disk, 1.2M-byte diskette, serial/parallel combined adapter, and 6 additional slots • 5170-099 supports up to 3M bytes of memory, 1 to 4 serial ports, 1/2 1.2M-byte diskettes, and 20M/4M bytes of fixed disk • based on the Intel 80286 16-bit processor chip, which operates at 6MHz rather than 4.77MHz of 8088 chip (basis of PC and XT) and uses 16-bit rather 8-bit wide data paths; Intel states the 80286 is up to 6 times as fast as the 8088; IBM states the PC/AT is 2 to 3 times as fast as the PC or XT; 80286 uses 24-bit addressing thus real memory can theoretically range up to 16M bytes • PC/AT uses 64K-bit memory chip • XENIX, based on Bell Laboratories' UNIX operating system, was developed by Microsoft; programs developed under the UNIX-like PC/IX operating system must be recompiled to run under UNIX; alternatively, they can run under PC/IX on the PC/AT but they have same memory ceiling and restrictions as if running on PC/XT • supports up to 2 communication links; can attach to IBM PC network through PC Network Adapter • can support as terminals: IBM PC with asynchronous communication adapter, PCjr, PC/XT, PC/AT, 3101 ASCII terminal, and other ASCII terminals • available beginning of 1985 • supports AT/370 Option Kit making it a System/370 workstation.

PC AT/370 • extended version of PC AT that operates as a System/370 workstation; it can process S/370 host through standard 3278/3279 Emulation Adapter.

IBM 3270 Personal Computer (5271 Series) • a multifunction unit that can run 7 concurrent sessions: 4 3270-type sessions, an IBM PC-DOS 2.0/2.1 session, and 2 local notepad sessions • datastream compatible with members of 3270 display features • available in 3 versions: 5271 Model 2 includes 256K-byte memory expandable to 640K bytes, 5151/5272 monochrome or color display adapter, dual-sided diskette drive and adapter, 5271 keyboard with 3270 host keytop-graphics, 3270-PC keyboard/timer adapter, and printer adapter with cable for graphics printer; 5271/3852 Model 4 includes same features except 320K bytes of memory, second dual-sided diskette, and printer adapter with cable for 5152 graphics printer; 5271 Model 6 has all features of Model 4 plus 10M-byte fixed disk and adapter• optional expansion unit for Models 2/4 allows 8 expansion sets and 10M-byte disk • batch communication program allows it to transmit files of transactions to hosts running VM/SP or MVS/TSO and IMS or CICS using SNA/SDLC protocol; can operate in either attended or unattended mode • requires 3274 or 3276 control unit • looks like 3278 terminal • Models 24 and 26 provide 384K bytes of RAM expandable to 640k bytes, use the 3295 Plasma Monitor, and the 3270-PC Control Program Version 1 Release 2.1.

IBM 3270 Personal Computer (5371 Series 1) • Model 14 includes 384K bytes of RAM, Display Unit Adapter, adapter for keyboard and tablet or mouse, one dual-sided diskette drive (350K bytes) and adapter, adapter for 5152/5182/3852 printers, and 3270 system adapter • Model 16 includes additional 192K bytes of memory for total of 576K bytes and a 10M-byte fixed disk and adapter • 3270-PC/G workstation includes 5279 color display and 5278 attachment • 3270-PC/GX workstation includes 5379 color display and 5378 attachment unit • graphics displays and 3270-PC Graphics Control Program • requires 3274 control unit • runs under IBM PC DOS 2.1.

5520 Administrative System • shared logic word processing/office automation system for text processing, file processing, 3270 emulation (SNA), system management, and document distribution; communicates over switched or non-switched links using SNA/SDLC protocol at 1200 bps with other 5520 systems, IBM 6670 Information Distributor, IBM Personal Computer, or S/370-compatible processor • consists of 5525 System Unit with attached 5253 Display Stations, 5219/5229/5258 Printers, 5321 Mag Card Unit, and other 5525 System Units • can operate in standalone, network, or host-attached mode; 3270 emulation allows it to function as 5253 display station and as 3270-type display communicating with S/370-compatible host using SNA/SDLC protocol; has access to DISOSS/370 for document library and application processing services • IBM PC can attach to 5520 through emulation of 5253 display station; provides power of PC with facilities of 5520.

5280 Distributed Data System • terminal or RJE-type system for distributed or specialized data entry applications; communicates in SNA/SDLC environment in batch or interactive mode with a S/370-compatible host • 5280 can operate as RJE terminal; up to 4 SNA utilities can interact with the same IMS or CICS database/data communications facility in the host; in BSC environment, looks like 3741 or 3780 terminal to IBM host processor Series/1, S/3, S/32, S/34, S/38 or another 5280 • supports single BSC or SDLC communications line at speeds of 600 to 4800 bps • supported as Logical Unit (LU) Type 1 in SNA-SDLC environment • also provides IBM 3270 emulation for either SNA/SDLC or BSC communications • can attach to 8100 under

 ©1984 Data Decisions

IBM SNA
System Network Architecture

DPPX and access S/370-compatible host via the DPPX/DSC facility.

8100 Computer System • can interface to S/370-compatible processor through 3705/3725 communications controller as terminal using SNA/SDLC or BSC line control; can attach to the integrated communications adapter on 4331 as terminal under BSC or SDLC line control; appears as IBM 3270 controller through its Datastream Compatibility (DSC) feature; thus, all terminals connected to 8100 can operate as IBM 3270 terminals connected directly to IBM S/370-compatible host • under DPCX (Distributed Processing Control Executive) operating system, functions as distributed 3730 or 3790 system; under DPPX (Distributed Processing Programming Executive) operating system, functions as host processor controlling other 8100s, Series/1s, 5280s, IBM PCs, and Displaywriters, or own network with local and remote terminals, while appearing as 3271 or 2772 RJE (BSC) or as 3276 (SDLC) terminal to front-end communications processor • consists of 8130A/B, 8140A/B/C, and 8150A/B models; all are single processor systems except the 8140C, which is a dual processor system, and the 8150B, which includes a dyadic processor; memory capacity ranges from 256K bytes on 8130A to 8M bytes on 8150B; performance range is about 0.15 MIPS for 8130A to 1.0 MIPS for 8150B • see 950-I048-8100 for full report on IBM 8100.

☐ Local Network Subsystems

Series/1 • up to 16 processors can reside on peer-to-peer network; processors connected together in daisy-chain and communicate with each other in DMA Mode • purpose of network is to increase processing power • operate standalone or communicate with host as SNA-SDLC station through front-end communications processor; functions as RJE terminal; can also interface to IMS/VS and CICS/VS applications programs for database and interactive processing functions.

8100 Processor • can function as host processor controlling local loop, other 8100s, or own network of local and remote terminals while appearing as a 3271 or 2772 RJE (BSC) or as a 3276 (SDLC) terminal to front-end communications processor.

IBM Cabling System • announced May 1984, provides components for wiring buildings so that customers can interconnect all their devices through a common system • in a statement of direction, IBM announced it plans to implement a "star-wired, token-ring local area network (LAN) using IBM Cabling System in the next 2 to 3 years" • it is assumed the token-ring LAN will be compatible with the IEEE 802.5 standard • Cabling System will support terminals, processor, and controllers for IBM 3270 Display System, 4300 System, 5250 Display System, System/36/38, 8100, Information System S/1 Minicomputer, 5520 Administrative System, 3600/4700 Finance Communication System, and 3680 Programmable Store System • adapters will attach IBM Personal Computers and the Displaywriter to the cable; large mainframes "may" interface indirectly to cable through an IBM 37XX communications controller or through a 3274 controller • uses star-wiring technique to connect offices or work areas to wiring closets; distribution panels and patch panels used in wiring closet to interconnect devices; distribution panel can cross connect 64 cables • IBM provides data-grade and voice-grade twisted copper cable and optical fiber cable • deliveries of the IBM Cabling System began in May 1984.

IBM PC Cluster • a group of hardware/software products that allow interconnection of up to 64 IBM PCs, PC/XTs, PCjrs, and Portable PCs in a cluster; products include **Cluster Adapter** for PC, Portable PC, and PC/XT; **Cluster Attachment** for PCjr; **Cluster Cable Kit**; and **IBM PC Cluster Program** • Cluster Adapter and Cluster Attachment for PCjr provide facilities to attach IBM PCs into a clustered, multiuser environment • cluster cable kit option provides connection facilities for 2 IBM PCs; 3 or more PCs (up to 64) can be interconnected using multiple cluster cable kits, a kit for each PC added • clustered multiuser configuration consists of a main coaxial cable bus with cable drops to the cluster adapter or cluster attachment; maximum length of the main 75-ohm coaxial cable is 3,200 feet; maximum cable drop length is 16 feet; transmission rate is 375K bps; baseband signaling and bus topology is used; access to the cable is through a CSMA/CA (Collision avoidance) protocol • cable kit consists of the main coaxial cable bus, 2 cable drops, 2 BNC T-connectors, and 2 terminating plugs; cable drops connect to either the IBM PC Cluster adapter or the PCjr Cluster Attachment; main coaxial cable length is 32 feet and cable drop length is 9 feet • adapter requires a full-sized expansion slot in the IBM PC, Portable PC, PC/XT, or IBM PC Expansion Unit; the new BIOS module is required; PCjr attachment cannot be installed with the PCjr diskette drive, internal modem, or parallel printer attachment; IBM intends, however, to provide this attachment for all PCjr models in the future • IBM PC Cluster is supported by the cluster programs, which provide file transfers, message send/receive, and message broadcast; cluster programs also provide for a disk server implemented on a PC, Portable PC, or PC/XT with one public read-only volume for the cluster and one private read/write volume per computer in the cluster; the rest of the disk is assigned to the server station • PCjrs without diskette can be downloaded with DOS and an application program • the Cluster Programs run under IBM PC-DOS 2.1; they may increase the amount of memory required for some programs; memory required is 29K bytes on the IBM PC, Portable PC, or PC/XT and 34K bytes on PCjr; disk server station requires 136K bytes; a cluster with one or more PCjrs must include a disk server • available second quarter 1984 • purchase price is $400 for PCjr Cluster Attachment, $340 for PC Cluster Adapter, $110 for Cluster Cable Kit, and $30 for BIOS update kit (for older PCs without new BIOS). Maintenance is unavailable for the cluster cable kit • one-time license fee is $92 for one computer and $400 for 5 computers • quantity discounts are available for both the hardware and software; hardware discounts is 5 percent for 3 to 10 units and 8 percent for 11 to 19 units; software discount is 12 percent for 20 to 49 eligible licenses, 16 percent for 50 to 149 licenses, and 20 percent for 150 or more licenses.

IBM PC Network • a fixed-frequency broadband network, with 2M-bps transmission rate using CSMA/CD access protocol; supports up to 72 IBM PCs within a 1,000-foot radius around the IBM PC Network Translator Unit; in addition to its basic function of translating the transmit (return) frequency of 50.75 MHz to the receive (forward) frequency of 219 MHz, the translator operates as the hub or center of a star-shaped network; transmit/receive channels require 6 MHz of the wideband frequency range each • basic translator provides connections for up to 8 IBM PCs, which can be located up to 200 cable feet away • Base Expander Unit provides 8 ports for the connection of up to 8 Distance Kits; short (up to 200 feet), medium (up to 400 feet), and long (up to 800 feet) distances from the Translator Unit; each short/medium/long Distance Kit provides connections for up to 8 PCs; the PCs can be located up to 200 cable feet away from the Distance Kit, thus total distance from PC to translator can be up to 1,000 feet • network uses 75-ohm coaxial cable (CATV compatible) and standard broadband components • IBM PCs require the IBM PC Network Adapter to interface to the network adapter is implemented on a card that fits into one full slot of the IBM PC: its components include an Intel 80188 processor, an Intel 82586 network controller, a fixed-frequency modem, and network microcode to offload the network control and interface functions from the IBM PC; network microcode, called network basic input/output system (NETBIOS), resides in ROM and provides the basis for program control of the network • NETBIOS supports up to 32 peer-to-peer sessions • network uses the Basic Input/Output System (BIOS) in the PC as the programming interface between the Network Adapter and the IBM PC-DOS 3.1 operating system • PC Network Program provides facilities to allow PCs on the network to share file servers, print servers, and message-switching functions; also provides a set of commands and menus so that users can perform network control functions; the facilities allow a user to configure the network program, establish or delete a network name for a workstation, establish a file-sharing environment, manage a print queue, communicate with other IBM PCs on the network, and transfer data files • in addition to the file, print, and message-switching servers that are part of the IBM PC Network Program, IBM offers a separate communications server to allow PCs on the IBM PC Network to communicate with applications running on an IBM S/370-compatible host; this server uses the SNA 3270 Emulation Protocol and allows PCs on the network to share an SDLC communication link to the host; emaulation is of a subset of an IBM 3274 Model 51C Controller, IBM 3278 Model 2 Display Station, IBM 3279 Model 52A Color

 ©1984 Data Decisions

IBM SNA
System Network Architecture

Display, and IBM 3287 Model 1 Printer; currently, it provides host-file transfer capability, host-/operator-initiated direct print, deferred print-to-disk file storage for adding to files already on disk or diskette, keyboard-mapping, and "hot-key" switching between 3270 emulation and a DOS application without terminating the 3270 session • in its statement of direction, IBM included the intention to provide IBM 3270 interactive data stream compatibility (DSC) for access to S/370-based applications for IBM PCs using "the token-ring protocol on the IBM Cabling System" • deliveries for IBM PC Network components began in October 1984 for PC Network hardware; deliveries are scheduled for first quarter of 1985 for the IBM PC Network Program, and first half of 1985 for IBM PC Network SNA 3270 Emulation Program.

Purchase price is $595 for PC Translator Unit, $695 for IBM PC Adapter, $59 for Base Expander Distance Kit, $39/$79/$89 for Short/Medium/Long Distance Kit; One-Time Charge (OTC) is $75 for PC Network Program and $375 for PC Network SNA Emulation Program.

Others • systems such as 3660 Supermarket Key-Entry System, 3680 Programmable Store System, and 4300 also support local loops, which can be considered local networks.

☐ Cluster Controller Subsystems

3270 Information Display Systems • popular terminal group with over 1,500,000 installed • includes controllers, display terminals, and printers • consists of many cluster controllers and display-printer terminals • see full report 950-I048-3270.

3271 Control Unit • supports clusters of up to 32 terminals such as 3277 displays, 3284/3286/3287 printers and 3288 line printers • communicates up to 7200 bps BSC and 9600 SDLC over nonswitched lines to S/370-compatible host.

3272 Control Unit • supports clusters of up to 32 terminals the same as 3271 control unit • for local attachment only to host.

3274 Control Unit • supports clusters of 8/12/16/32 terminals such as 3277/3278 displays, 3279 color displays, 3284/3286/3287 printers, and 3288/3289/3262 line printers • local/remote attachment to S/370-compatible host; remote and direct loop attachment to IBM 8100 • communication rate up to 9600 bps BSC or SDLC over nonswitched lines only.

3276 Control Unit Display Station • supports clusters of up to 8 terminals such as 3276 integral; up to 7 others can be 3278 displays, 3279 color displays, 3287 printer, and 3289/3262 line printers • local/remote attachment to S/370-compatible host; remote or direct loop connection to 8100 • communication rate up to 7200 bps BSC and up to 9600 bps SDLC over switched or nonswitched lines.

5250 Information Display System • family of workstations containing keyboard/displays and printers that can be connected locally or remotely to a variety of processors • primarily used with Series/1, S/34, and S/38; also attaches to 5520 Administrative System • includes 5251/3 Display Station, 5252/4 Dual Display Station, and 5256 Printer • can attach directly to S/34, S/38, or Series/1 and communicate SNA/SDLC to S/34 or S/38 over switched or nonswitched lines at 1200/2400/4800 bps • see full report 940-I048-5250.

5294 Remote Control Unit • for S/36 and S/38 only; provides for communication between S/36 or S/38 and the following workstations: 5251-011/5251-999/5291/5292 Display Stations, 5219-D01/5219-DO2/5224/5225/5256 Printers, and 5150 PC/5160 PC XT with 5251 emulation feature • provides for attaching 4/18 workstations • can communicate using switched or leased circuits, EIA/DDSA/X.21 interface, and 2400/4800/9600 50K bps data rate; supports X.25.

3600 Financial Communication System • operates independently, or as local or remote SNA-SDLC cluster controller for loop-attached 3600 financial terminals and 3694 document processors; communicates in SDLC with S/370-compatible host through front-end communications processor or through integrated communications adapter on 4300; acts as data gathering device for host • consists of 3601 or 3602 Finance Communication Controller, 3603 Terminal Attachment Unit, at least 1 3604 Keyboard Display, and loop-attached terminals such as 3606 Financial Services Terminal, 3608 Printing Financial Services Terminal, 3610 Document Printer, 3611 Passbook Printer, 3612 Passbook and Document Printer, 3614 Consumer Transaction Facility, 3615 Administrative Terminal Printer, 3616 Passbook and Document Printer, 3618 Administrative Line Printer, and 3624 Consumer Transaction Facility; 3602 can support up to 18 3694 Document Processors • 3694 can attach to a 3705 communications controller or to communications adapter on the 4300 through 1200-bps communications link; 3694 can operate as controller and support up to 4 additional 3694 units • device adapter on 3601 or 3602 controllers attach combinations of up to 8 3262 Line Printer(s), 3278 Display Station(s), 3287 Printer(s), and 3289 Line Printer(s) • local loops operate at 1200/2400/4800 bps and remote loops at 1200/2400 bps • number of devices per loop is limited by amount of control storage available as well as by throughput requirement on controller and on loop.

3601 Finance Communication Controller • no longer available; replaced by 4701.

3602 Finance Communication Controller • controls all functions of loop-attached financial terminals, and all communications with the S/370-compatible host through 3705 front-end or communications adapter on 4300 • supports 5.2-/9.3M-byte disk that can attach 1-/2-sided diskettes, up to 120K bytes of programmable storage, and up to 8 loops for attaching terminals; 7 loops can be remote • SDLC communications to host at speeds from 1200 bps to 9600 bps • loop transmission speeds of 1200/2400/4800 bps for locally attached terminals and 1200/2400 bps for remotely attached terminals; maximum aggregate loop throughput per controller is 12,000 bps • can also serve as cluster controller for up to 18 3694 Document Processors.

3630 Plant Communication System • includes 3631/3632 Plant Communication Controller to attach 3640 interactive reporting terminals to S/370-compatible host via 3705, 4300 processor, or 8100 system via 8100 data link; controller can function independently of host and operate while host is down; all 3640 terminals are attached to controller through customer-owned directly attached loops or through 3842/3843 data link-attached loop • designed for use with controllers in office area while terminals are located in industrial work areas • consists of 3631 and 3632 Plant Communication Controller, 3842 and 3843 Loop Control Units, and terminals such as 3604 Keyboard Display, 3641 Reporting Terminal, 3642 Encoder Printer, 3643 Keyboard Display, 3644 Automatic Data Unit, 3645 Printer, 3646 Scanner Control Unit, 3647 Time and Attendance Terminal • each 3631/3632 controller requires 1 directly attached 3604 Model 6 Keyboard Display for operator control • 3631/3632 controllers communicate with host using SDLC protocol over nonswitched lines at 600/1200/2400/4800/9600 bps; can also attach directly to 3705 communications controller.

3631 Plant Communication Controller—Models 1A & 1B • programmable controller with 64K bytes of application storage expandable to 128K bytes in 16K increments; integral control storage can be expanded by 16K bytes; 250K/500K bytes of diskette storage • requires EIA/CCITT interface to attach external modem for communication with host and SDLC communication feature for transmission at 600/1200/2400/4800/9600 bps; terminal attachment through directly attached loops or through data link attached loops using 3842/3843 Loop Control Units • controller can support 2 loop adapters; each can attach loop with 1/2 lobes • number of units that can be attached determined by control storage capacity and loop throughput of 9600 bps • total throughput of controller cannot exceed 28.8K bps, the aggregate transmission speed of attached loops and communications links.

3632 Plant Communication Controller—Models 1A & 1B • similar to 3631 except includes 5M/9.2M bytes of fixed disk in addition to diskette storage, and the base unit has 30% larger control storage capacity to store microcode needed to attach devices and features.

IBM 3640 Controller • 8100 can operate as controller of 3640 Plant Communication System terminals allowing them to access database facilities in 8100 or in S/370-compatible host through the Datastream compatibility (DSC) facility; DSC makes device

 ©1984 Data Decisions

IBM SNA
System Network Architecture

appear as 3270 terminal.

3842/3843 Loop Control Unit • provides capability to connect remote loop to 3631/3632 Plant Communications Controller, 4300 processor, or 8100 information system at 1200/2400/4800/9600 bps over nonswitched voice grade lines • loop can be up to 2 cable miles long; loop transmission speed is up to 9600 bps.

3650 Programmable Store System • operates as SNA/SDLC local or remote cluster controller for the loop-attached retail store terminal devices; provides SDLC transmission at 2400 or 4800 bps over switched or nonswitched lines to S/370-compatible host, 4300 or 8100; requires front-end communications processor for SNA-SDLC connection to S/370-compatible processor host or communication adapter on the 4300 • acts as data gathering device for host • includes IBM 3651 Store Controller and loop-attached terminals, 3275 Display Station, 3653 and 3683 Point of Sale Terminals, 3657 Ticket Unit, 3663 Supermarket Terminal, and 3784 Printer.

3651 Store Controller—Models A60 & B60 • provides control of up to 24 attached terminals; receives data from terminals and edits it, performs logical and arithmetic operations, logs data, and forwards data to host system • includes 64K bytes of control memory expandable with 126.9K bytes in 8K-byte increment, integral disk storage of about 5/9M bytes, host communications adapter, loop adapter, and terminals • supports up to 2 store loops • 600/1200 bps available for communication with host over switched lines; includes auto-answer; 2400 bps over leased lines for backup.

3660 Supermarket Key-Entry System • operates as local or remote SNA/SDLC cluster controller for loop-attached supermarket terminals; requires front-end communication processor to communicate SNA/SDLC with S/370-compatible host at 1200 bps, or to integrated communications adapter on 4300; acts as data gathering device for host • requires 3661 store controller, and 12 to 18 loop-attached 3663 supermarket terminals • can run all checkout functions as in-store, closed loop system • input is from 3663 keyboard and output is to 3663 display or printer.

3661 Store Controller • no longer available.

3660 Supermarket Scanning System • provides complete checkout, data entry, and store support functions for supermarket using Universal Product Code Symbols to mark grocery items • uses common carrier facilities to communicate BSC or SDLC at 2400 bps in half-duplex mode to S/370-compatible host or 4300 using front-end 3705 Communications Controller or communications adapter on 4300 • supports up to 24 stations connected by in-store loop • requires 3651 store controller, 3663 Supermarket Terminal, 3667 Checkout Scanner, and 3669 Store Communication Unit to interface system to common carrier facilities.

3651 Store Controller—Supermarket Models 25 & 75 • provides customer checkout, store support, data capture, and communications with host processor • up to 24 IBM 3663 Supermarket Terminals in 1 store location.

3680 Programmable Store System • operates as local or remote SNA/SDLC cluster controller for loop-attached retail store terminals; requires front-end communication processor to communicate BSC or SNA/SDLC over switched or leased common carrier lines with S/370-compatible host at 1200/2400/4800 bps; can also communicate through integrated communications adapter on 4300; acts as data gathering device for host • can also communicate SDLC with IBM 8100 host over nonswitched lines • requires IBM 3684 Point of Sale (POS) control unit to provide store level control for 3683 POS Terminals and 3685 Display Terminals; terminals attach to control unit over 4-wire loop operating at 2400 bps.

3684 Point of Sale Control Unit—Models 1 & 2 • data collection and processing terminal that operates as single or master unit; master unit controls multiple loop-attached 3683 Point of Sale Terminals or 3685 Display Terminals • initial machine load is from S/370-compatible host • includes 32K to 120K bytes of memory, 1M-byte diskette, up to 2 cash drawers, and bidirectional matrix printer • data entry is through 35-/48-key keyboard or magnetic or OEM OCR hand-held reader; data output is to an 8-digit numeric display with up to 32 status/guidance indicators or 36-character alphanumeric display.

3790 Communication System • programmable operator-oriented terminal system for remote offices providing data entry, data inquiry, document preparation, and SDLC communications to host at up to 9600 bps • consists of 3791 Controller, 3792 Auxiliary Control Units, 3793 Keyboard-Printers, and attachment for 2741 communications terminals (Selectric Typewriter Terminals) • IBM 3730 can also operate as 3790 (see Distributed Computer section).

3791 Controller—Models 1C, 2A, 2B • intelligent cluster controller in 3790 system; communicates with S/370-compatible or 4300 host system by local channel attachment, through front-end 3705 communication processor, or by communications adapter on 4300 • communications are over switched or nonswitched links, using SDLC protocol only, at up to 9600 bps • can operate independently of host • attaches 10M to 30M bytes of disk storage plus removable diskette storage, line printer (80/132 columns, 155/410 lpm, 48/64/96-character set, ASCII or EBCDIC characters), up to 4 3411 magnetic tape units and control, 8K/16K bytes of additional control storage, 3793 Keyboard-Printers, 3277 Display Stations, 3284/3286/3287 Printers, 3288 Line Printers, and up to 3 3792 Auxiliary Control Units, which attach up to 4 3793 keyboard-printers and communications lines for 2741 communications terminals • supports maximum of 31 displays and printers attached in any combination; up to 24 operator positions can be attached for data entry through 3760 Key Entry Stations; up to 16 operator positions can be attached through 3762 Payment Transaction Processors; with Data Link Adapter supports 3276 Control Unit Display Station and devices that connect to it • total 3791 capacity is 31 displays and printers, 5 Data Link Adapters, and 4 3793 Keyboard-Printers; with 3 3792 Auxiliary Control Units, total capacity expands to 127 devices plus 1 3791 attached line printer • 3791 Model 11C, 12A, and 12B operate as controller for 3730 Distributed Office Communication System.

4700 Finance Communication System (4701) • programmable controller connects 3600 and 4700 financial terminals to S/370-compatible host or 8100 Information System • transmission to host using SDLC protocol at 9600 bps or BSC protocol at 4800 bps; terminals are loop-attached to controller; aggregate loop throughput is 16.8K bps independent of SDLC host attachment and 14.4K bps including BSC host attachment • can also connect to S/34 directly or remotely using SDLC protocol.

6670 Information Distributor • high-speed printer for word processing and data processing applications • can format and print documents from magnetic cards and can transmit/receive data to/from S/370-compatible processor or 8100 system • can operate as an SNA LU4 device.

IBM 8100 Information System • can function as cluster controller for terminals connected to local or remote loops; terminals can access database or other facilities in 8100 or use DSC facility to access facilities in S/370-compatible hosts • supported terminal families include 3640 Plant Communication System Terminals, 3274 and 3276 Control Units, 4701 Control Unit, 3262/3268/3287/3289/3736 Printers, 3732 Text Display Station, and 8775 Display Terminals • communicates with host over SNA/SDLC link at data rates up to 56K bps • 8100 can also function as replacement for 3790 communication system • see full report 950-I048-8100.

Other Supported Sytems • SNA through ACF/NCP/VS supports virtually all IBM processors and systems, including products no longer actively marketed, as well as current products and other compatible systems • these older IBM products include S/3, 1131 Central Processing Unit, 1826 Data Adapter Unit, 2715 Transmission Unit, 2772 Multipurpose Control Unit, 2780 Data Transmission Terminal, 2972 Station Control Unit, 3735 Programmable Buffered Terminal, 3741 Data/Work Station, 3747 Data Converter, 5110 Portable Computer, S/360 Models 20 to 195, and S/370 Models 115 to 168 MP; all are supported as BSC systems • IBM 1051 Control Unit, 2740 and 2741 Communications Terminals, AT&T 83B3 Line Control Type, Western Union 115A line control type, CPT-TWX Models 33 and 35 line control type, and World Trade Teletypewriter Terminals

 ©1984 Data Decisions

IBM SNA
System Network Architecture

are supported as start/stop stations • many systems not directly supported are indirectly supported through emulation of a supported product: IBM 3780 Data Communication Terminal and 6670 Information System are supported as 2772 Multipurpose Control Units for BSC communications; IBM S/7 Processor Station, S/32 Batch Work Station, and Series/1 are supported as S/3s; S/34 is supported as 3767, 3770 or 3791; S/38 is supported as 3770 for both BSC and SDLC communications; and S/32 is supported as 3770 for SDLC communications • some systems are supported in more than one way—SDLC, BSC, start stop, and emulation of other stations or systems.

☐ Terminals

Most terminals are supported through connection to a cluster controller or to a loop on a distributed processor. Some terminals, however, have enough control logic to communicate via SDLC and to function as SNA peripheral nodes and are supported by ACF/NCP/VS.

IBM 3101 Display Terminal • TTY replacement terminal; uses ASCII code; modular typewriter-style keyboard with numeric and cursor keyboards; swivel and tilt displays; can attach auxiliary 3102 printer • operates in asynchronous mode, half-/full-duplex at 110 to 9600 bps • can connect directly to hosts through EIA RS-232C interface or through modem to switched or dedicated facilities • can access SNA network through Series/1, 8100, or NTO interface of 3705 or 3725 Communications Processor or through 3710 Network Processor; requires 7426 Terminal Control Unit to interface to loop on an 8100 or 4300 system • see full report 940-I048-3101.

IBM 3104 Display Terminal • designed for use with the 4300 or 8100 systems to enter and receive data • communicates with host system using SDLC over a directly or remotely connected loop at 9600 or 38.4K bps; the data link-attached loop requires the 3843 Loop Control Unit • offers functions similar to 8775 Model 1, 3276 Model 12, and 3278 Model 2; compatible with data stream on 3276, 3278, and 8775.

3275 Display Station—Model 3 • single remote CRT display station • connects to 3650 Programmable & Retail Store system through local loop • 1920-character display, 66-key EBCDIC keyboard • can attach 3284 Printer.

3640 Plant Communication Terminals • includes 3641 Reporting Terminal, 3642 Encoder Printer, 3643 Keyboard Display, 3644 Automatic Data Unit, 3645 Printer, 3646 Scanner Control Unit, and 3647 Time and Attendance Terminal • can interface to host system through IBM 3631 or 3632 Plant Communication Controller or through IBM 8100 DPPX system running PS/3640 software module and operating as controller; terminals are loop-attached to 3631, 3632, or 8100.

3767 Communication Terminal—Models 1, 2, 3 • keyboard/printer terminal with control features for online or off-line operations; communicates SDLC at speeds up to 2400 bps over switched/non-switched lines to S/370-compatible host through front-end 3705 Communications Controller, to 4300 through Communications Adapter, or to 8100 Information System • includes 44-key alphanumeric keyboard and 40/80/120-cps matrix printer; special features supply buffer with edit, scientific calculate, and magnetic stripe reader.

3770 Data Communication System • series of communications terminals that communicate with a S/370-compatible host through front-end 3705/3725 Communications Controller and with 4300 through its integrated communications adapter • SDLC communications are directly supported, BSC communications are indirectly supported through 2770 BSC programming support; terminals can use 2701 Data Adapter for direct attachment to a channel of a S/370-compatible host.

3771 Communication Terminal—Models 1, 2, 3 • nonprogrammable, desk-style console/keyboard/printer that operates in off-line, online batch, and online interactive modes • memory can be expanded to 4K or 8K bytes; 44-key EBCDIC keyboard • bidirectional matrix printer, 40/80/120 cps, 132 columns, 10 cpi, 6 lpi; variable-width forms tractor • other peripherals include 3501 card reader and 3521/3782 card punch operating at 50 cpm • communications rate is up to 4800 bps.

3774 Communication Terminal—Models P1 & P2 • user-programmable desk-style console/printer/keyboard • same as 3771 except memory can be expanded by 4K/8K/12K/16K bytes; special features allow attachment of 1 or 2 diskettes, 99.8K bytes each; terminal is user-programmable; and printer is available in 80-/120-cps models only.

3775 Communication Terminal—Model P1 • desk-style console/keyboard/printer • same as 3771 model except memory can be expanded by 4K/8K/12K/16K bytes, printer is belt printer that operates at 80 lpm (94-character set) and 120 lpm (64-character set), and special features allow attachment of 1 or 2 diskettes (99.8K bytes of storage each).

3776 Communications Terminals—Models 1 & 2 • medium-speed RJE terminal • operates as SNA single logical unit or as BSC terminal; not designed as interactive terminal • EBCDIC, (ASCII optional) 44-key keyboard • belt printer that operates at 300/400 lpm (48-character set), 230/300 lpm (64-character set), or 160/230 lpm (94-character set); 132 columns, 10 cpi, 6/8 lpi; variable-width forms up to 15 inches wide • operates in off-line, online batch, and dual data path modes • special features support 1 or 2 diskettes (388.9K bytes each), 3501/2502 card reader, and 3521 card punch • communication transmission speed is up to 4800 bps.

3776 Communications Terminal—Models 3 & 4 • medium-speed remote RJE terminal; operates as SNA Multiple Logical Unit (MLU) terminals • includes display and keyboard for control and communication with host • not designed as interactive terminal • 44-key EBCDIC (ASCII optional) keyboard; 1024-character display in 16 lines of 64 characters each • belt printer operates at 300/400 lpm (48-character set), 230/300 lpm (64-character set), or 160/230 lpm (94-character set) • supports 1/2 diskettes (388.9K bytes each), 3411 magnetic tape unit and control, 2502 card reader, and 3521 card punch • communication transmission is 2400 to 9600 bps and 19.2K bps over full-duplex nonswitched facilities • can also attach directly to 3705 and operate in half- or full-duplex mode at 14.4K bps.

3777 Communication Terminal—Model 2 • high-speed RJE terminal; operates as a Multileaving Workstation • support EBCDIC/ASCII keyboard, 1024-character console display, 1/2 printer(s) (up to 1024 lpm), 1/2 diskette(s), magnetic tape unit, card reader, and card punch • BSC communication transmission rates are 2400/4800/9600 bps or 19.2K bps.

IBM 5250 Information Display System • interactive console, standalone, chain, or cluster display terminal system employed for inquiry/update, data entry, record building, and other tasks in conjunction with host processor and database • used with IBM S/34, S/38, and Series/1 processors • 5251 Model 12 remotely attaches to S/36 and S/38 host processors via SNA/SDLC and BSC in point-to-point and multipoint configurations • 5251 Models 999 and 11, Model 5252, Models 5291 and 5292 locally attach to S/36, S/38, and Series/1 processors via I/O ports • SNA/SDLC communication as LU4 and LU7 devices • data rates up to 9600 bps on dedicated (nonswitched) lines; 4800 bps on switched lines; half-duplex • EBCDIC code; can also attach to S/36 through 5294 Remote Control Unit • see full report 950-I048-5250.

IBM 6580 Displaywriter System • a multifunctional display-based system with text, data, and records processing, communications, and electronic document distribution capabilities • edit and format features include: menu prompting; multiple stored formats; auto-return, word wrap, margin adjust, underscore, center, decimal tab, and line spacing; auto-paginate; keyboard and stored text assembly/merge; page and string search; character/word/line/sentence/paragragh/page delete; spelling dictionary • supports routine administrative tasks in office environment such as personnel tasks for applicant recruitment and employment, correspondence calendar, action and maintenance item tracking • supports text processing and IBM's Document Interchange Architecture (DIA); provides Data Stream Compatibility (DSC) to host system through emulation of an IBM 3274 Model 51C control unit, and SNA/SDLC communication facility at up to 9600 bps over switched (4800 bps), point-to-point, or multipoint links • also supports BSC and asynchronous communications for document transmissions with other systems

 ©1984 Data Decisions

IBM SNA
System Network Architecture

• 184K- to 2M-byte diskette storage capacity • can operate standalone or as a shared-resource system, with up to 3 workstations sharing a printer.

IBM 8815 Scanmaster I Facsimile Terminals • high-performance, digital facsimile transceiver; message store/forward routing in conjunction with host processor; runs under Distributed Office Support System (DISSOS)/370, which allows distribution of messages/documents to office workstations such as Displaywriter, 8100/DOSF, and 5520 Administrative System • see report **950-I048-8815** for details.

8775 Display Terminal • high-function terminal for local or remote loop attachment (via port) or for remote or local communication attachment (via port; not available for direct display/printer attachment) • 4 models provide choice of loop (Models 1/2) or communication (Models 11/12) attachment, and choice of display formats of 960/1920/2560 characters per screen (Models 1/11) and 960/1920/2560/3440 characters per screen (Models 2/12); choice of screen size is system option not operator option; displays 96 characters or 224 characters (APL) with special feature; all display lines are 80 characters long; number of lines available are 12 (for 960 characters), 24 (for 1920 characters), 32 (for 2560 characters), or 43 (for 3440 characters); a 9x16 matrix is used for screen sizes up to 2560 characters; a 9x12 matrix is used for the 3440-character size; the basic terminal is essentially equivalent to a 3270 in terms of field formatting capabilities, including protect/unprotect, alphanumeric/numeric, normal-/high-intensity display, display/nondisplay, and selector pen allowed/not allowed; depending on keyboard selection, which includes data entry and typewriter-style options, from 7 to 24 program function keys are included • Cursor Select standard feature provides "light pen" type of field selection by using cursor and special key.

Interactive Display Text Facility (IDTF) • program product licensed to an 8100 processor and downline loaded for execution to an 8775 terminal attached to the processor • designed to be used with Distributed Office Support Facilities (DOSF), DPCX operating system, and Distributed Office Support System (DIOSS) • this support gives an operator access to text functions of DOSF and host-oriented storage, retrieval, and distributed facilities of DISOSS; the data functions are determined by application program to which 8775 is attached; cannot function with 3624 Enhanced Functions or 5110 Partitions and Scrolling; selection is from 8775.

IBM Personal Computers • all can operate as terminals through terminal emulation packages or through emulation of 3274 controller with attached terminals • provides 3101-29 (ASCII), 3270 BSC and SNA/SDLC, 3770 RJE, and 5250 terminal emulations for communications with virtually all of IBM computer systems; S/370 compatible mainframes (4300 and 3000 Series), System/36/38, and Series 1 • 5520 Administration System provides adapter to support the PC as a workstation and provide access to DISOSS/370 file transfer functions • 5250 Emulation allows PC to operate standalone PC or as a 5250 Workstation with 5256 or 5219 Printer; can emulate 5219 or 5292-1 Workstation or 5256 Matrix Printer or 5219 Printer • remote 5250 Emulation allows PC to emulate 5294 Remote Control Unit with terminals and printers attached • PC/VM Bond which runs on both a PC and VM, host allows a PC to interface to OVM host system to access data; services permit text or data to be stored/retrieved from host system by PC; VM host operates as a virtual disk system; PC looks like a 3278/79 terminal.

☐ Support Equipment

Modems

Many of IBM's line adapters or line sets include integrated modems. IBM's external modems currently available are intelligent. They perform self-test diagnostics, local analog and remote digital loopback, and provide visual indicators for line quality/signal level, test mode, and carrier detect. The modems are supported by the Network Problem Determination Application (NPDA) program that runs under the Network Communications Control Facility (NCCF) which in turn runs as an applications program under ACF/VTAM, ACF/VTAME, and ACF/TCAM V2. See full report 950-I048-3860 on IBM modems.

IBM 3863 Model 1 • suitable for point-to-point or multipoint operation over an unconditioned 4-wire dedicated Type 3002 voice channel • full-duplex, synchronous at 1200/2400 bps.

IBM 3863 Model 2 • designed for DDD network via direct connection; FCC certified • half-duplex, synchronous at 1200/2400 bps.

IBM 3864 Model 1 • suitable for point-to-point or multipoint operation over 4-wire dedicated Type 3002 voice channel • full-duplex, synchronous at 2400/4800 bps.

IBM 3864 Model 2 • designed for operation over DDD network via direct connection; FCC certified • half-duplex, synchronous at selectable 2400/4800 bps.

IBM 3865 Models 1 & 2 • designed for point-to-point (Model 1) or multipoint (Model 2) operation over unconditioned or conditioned 4-wire dedicated Type 3002 voice channel • half- or full-duplex, synchronous at selectable data rates of 4800/9600 bps • single channel except Model 1 supports up to 4 subchannels (2400 or 4800 bps).

3868 Models 1, 2, 3 & 4 • rackmounted modems compatible with standalone counterparts: Model 1 with 3863 Model 1, Model 2 with 3864 Model 1, Model 3 with 3865 Model 1, and Model 4 with 3865 Model 2 • include Extended Diagnostics as a standard feature; all contained in 3866 Multimodem Enclosure.

Multiplexers

Generally, IBM does not use multiplexers; communications controllers acting as local and remote front ends, terminal cluster controllers, and 3865 Model 1 modem perform the multiplexer function. IBM does offer the 3299 Terminal Multiplexer for the 3274 Control Unit to reduce the amount of cabling for connecting terminals to the 3274. It functions for local connection only.

Network Control Systems

IBM's approach to network control is through its intelligent modems supported by NPDA software running under NCCF, treated as an application by the host access method. IBM has no separate network control systems.

Protocol Converters

IBM offers the 7426 Terminal Interface Unit as a standard product to attach ASCII devices to IBM 4231, 4331, and 8100 systems.

IBM 7426 Terminal Interface Unit • protocol converter between ASCII and 3270 protocols; ASCII device appears to 4321/4331/8100 as a 3276 Control Unit with 3278 displays and 3287 printers • ASCII devices can attach through 7426 to 4331/8100 loop or through SNA/SDLC leased line data link; 4 downstream ports are available; communication data rates are at 9600 or 38.4K bps on loop or up to 9600 bps on data link • supports IBM Personal Computer, IBM 3101, and IBM 7485 Display Terminal.

• END

 ©1984 Data Decisions

IBM Corporation CICS (OS/VS & DOS/VS)
TP Monitor System

■ PROFILE

Function • multithread, multiprogramming, multiprocessing communications monitor.

Computer/Operating Systems Supported • any System/370, 3000, 4300, or compatible computer; DOS/VS(E), OS/VS1, OS/VS2(MVS), and VM/370.

Networks & Protocols • SNA • SDLC, BSC, start/stop; switched or nonswitched.

Languages Supported • COBOL, PL/1, assembler; RPG II (DOS/VS(E) only).

DBMS Interfaces • IMS/VS; DL/1 DOS/VS; DL/1 Entry; SQL/DS.

Communications Interfaces • Intersystem Communications (ISC) link.

TP & File Access Methods • BTAM, BTAM-ES (DOS/VSE), ACF/VTAM(E); for OS/VS add TCAM, ACF/TCAM, GAM • VSAM, ISAM, BDAM, SAM, and DL/1 database access.

Terminals • 3270 plus most other IBM display terminals (and equivalents); 3600 Finance System; most GSD small systems as front-end processing units.

Special Features • Intersystem Communications Facilities (ICF); High Performance Option (HPO); Asynchronous Transaction Processing (ATP); FASTER Transaction Processing Descriptions (TPD); Multi-Region Operations (MRO); Development Management System (DMS/CICS/VS); and more.

Security • optional sign-on facility; security code assignments; RACF (Resource Access Control Facility) security management program (optional) for MVS systems only.

Logging/Accounting • trace and dump utilities; SMF (System Management Facility); transaction journals and logs.

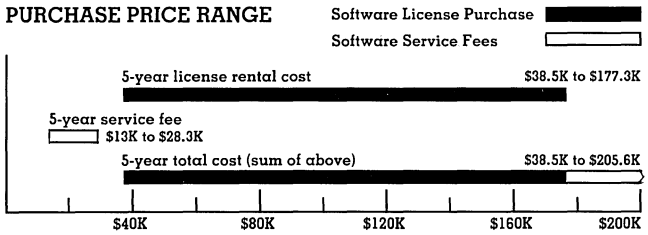
Failure/Recovery • Dynamic Transaction Backout facility; transaction and emergency restart options; a series of user exits for program, terminal, and node error recovery.

Current Version • CICS/DOS/VS Version 1, Release 6 (V.1, R.6); CICS/OS/VS Version 1, Release 6.1 (V.1, R6.1).

Installations • it is estimated that there are over 4,000 CICS users worldwide.

Comparable Products • Altergo SHADOW II, Polygon INTERCOMM, Software AG COM-PLETE, Cincom ENVIRON/1, and others.

PURCHASE PRICE RANGE



IBM CICS/VS PRICING solid bar shows typical min/max configuration price range based on a 60-month rental of the license; open bar shows the corresponding service fee range for the 5-year period using the multiple monthly license support (MMLS) rates • **MINIMUM CONFIGURATION** is based on a CICS/VS/DOS system with no options • **MAXIMUM CONFIGURATION** is the CICS/VS/OS system with the FASTER, SDF/CICS, and DMS/CICS options and the Application Generation feature.

Vendor • International Business Machines (IBM) Corporation, Information Systems Group • National Accounts Division; 1133 Westchester Avenue, White Plains, NY 10604; 914-696-1900 • National Marketing Division; 4111 Northside Parkway, Atlanta, GA 30327; 404-238-2000.

Canada • IBM Canada Ltd; Markham, 3500 Steeles Avenue East, Markham, ON L3R 2Z1 • 416-474-2111 • offices located in other cities in Canada.

■ ANALYSIS

CICS (Customer Information Control System)/VS Version 1, Releases 6 (DOS) and 6.1 (OS) are the latest offerings of a communications-oriented product that started out as a simple terminal control program to handle simple transactions in a relatively nonsophisticated manner. All the program had to do was control the transfer of data from a terminal (either local or remote) to the application program in a host computer over communications lines. From these humble origins, CICS has become the byword and model when one talks about communications monitors. It has been enhanced, modified, added-to, and generally restructured to support almost every and any type of communications environment that could be desired. It has been interfaced to database management systems and has been expanded to operate in multithread, multiprogramming, and even multiprocessing configurations. One could measure the success of CICS through the simple observation that there are more CICS users throughout the world than there are users of all other TP monitors combined. During the past year it has become obvious that this very fact has caused the independent TP monitor vendors to look for other ways to spend their R&D dollars. With IBM's huge user base demanding enhancements, the independents are hard pressed to keep pace, and appear to be dropping out of the race.

Although IBM actively supports only the VS versions of CICS, earlier versions of CICS are still very much in use within the customer base. Non-VS users can install the DOS and OS standard versions of CICS, and small DOS/VS users are catered to by the CICS/VS/DOS Entry Level System (ELS), which is still very popular because it is a basic uncomplicated TP monitor that can be installed without lengthy and complex planning. Another measure of CICS's popularity is the large volume of independently supplied systems and applications software designed to support CICS installations. And we can't think of one IBM-oriented DBMS on the market that is not offered with a CICS interface. Even IBM's IMS/VS users have turned more frequently to CICS than to IMS/DC.

IBM has wisely maintained both the OS/VS and DOS/VSE versions of CICS/VS at basically the same performance levels. This accomplishes 2 important tasks: it allows IBM to concentrate all its development efforts onto one product instead of several, and it simplifies the user migration path from the smaller DOS environment to the larger OS/VS environment.

One of the main objectives of the CICS designers appears to be to achieve a closer interaction between CICS/VS and the various IBM/DBMS products. The Intersystems Communications facility is one factor in this movement. For the future, one can expect to see increasingly tighter connections among CICS/VS, the IBM operating systems, and the IBM DBMS products. This is attested to by the fact that CICS/DOS/VS V.1 R.6 can interface with DL/1 DOS/VS Release 1.6 or SQL/DS Release 1. The reality is that either new products will be built with CICS/VS hooks, or CICS/VS will be modified to accommodate the product, eventually extending into the enormous body of IBM applications software.

 ©1985 Data Decisions

IBM Corporation CICS (OS/VS & DOS/VS)
TP Monitor System

☐ Strengths

The quality of flexibility is certainly not unique to CICS/VS, but seldom is it found in such extensive quantities. This flexibility covers the entire range of CICS/VS product support, from the smallest entry-level version to the most sophisticated configuration that can be designed. The number of features and facilities that are either integrated into CICS/VS or can be generated into a tailored system far exceeds the capabilities offered by any competitive system. Support for CICS/VS is based on user demands, and with a user base as large as CICS's base, the enhancements and modifications come pretty fast, a fact attested to by the availability of a facility in CICS V.1/R.6 that provides an interactive process for defining groups of CICS transactions, programs, mapsets, partition sets, and profiles, and the capability to dynamically add or alter these resources on a running CICS system. This facility, by the way, will significantly improve the operational aspects of the system. If you have an IBM-only hardware configuration, you can be practically guaranteed that all the CICS interfaces have been well tested and firmly integrated.

Versions of CICS are available for almost every size organization, and conversion or upward migration is relatively easy. The interfaces to the IBM DBMS systems are uniquely defined, and the ability to tie in multiple CICS machines so that they can share applications and files has been greatly enhanced by the introduction of the Multi-Region Option and the Intersystem Communications facility. Additional improvements designed specifically for the MVS/370 and MVS/XA user who has a requirement for greater use of multiprocessor resources, virtual storage constraint relief, or advanced database facilities are included in the latest CICS/OS/VS release (V.1 R6.1). This release enhances CICS usage of MVS/XA and tightly coupled multiprocessors.

CICS/VS is completely macro-generative, which simplifies the tailoring process and minimizes the possibility of carrying "dead weight."

☐ Limitations

Given a library of options to work from, a CICS/VS system configuration exercise requires a great deal of planning and substantial knowledge, not only about communications, but about the makeup of CICS itself. Most installations need at least one resident CICS "expert," more if possible. Another major problem is how to select exactly the right version of CICS for a corresponding operating system level (and/or DBMS level) to arrive at the most efficient total system. In many cases, users must upgrade either the operating system or DBMS level (or both) to realize some of the enhancements offered with an updated version of CICS. A perfect example of this problem is that when IBM dropped support of CICS/VS V.1/R.5 for SVS users, SVS installations must remain at V.1/R.4 to utilize CICS/VS.

In a sense, the same logic holds true for small entry-level DOS users. With the CICS/VS/DOS Entry Level System (ELS), which is no longer actively supported but is mentioned with frequency and regularity in the IBM documentation, users are given a prepackaged, stripped-down version of CICS that can be used in a DOS/VS installation. The user of ELS has nowhere to go once ELS is implemented unless a move to CICS/VS/DOS is undertaken. Worse yet, the ELS exercise is essentially wasted. ELS users must still go through the painful CICS/VS planning/installation chore because ELS supports so few CICS/VS features.

Performance is not a CICS/VS strong point. Much of this weakness is caused by the many active elements configured into the system, but quite a bit of it is also caused by incompatibilities among CICS/VS, the operating system, and other major system software. Even IBM warns users that the performance level of a VM/370 system running CICS/VS will be drastically affected by the overhead incurred under VM. The 24-bit design running in a 31-bit machine (3081) incompatibility problem mentioned in our previous report no longer applies inasmuch as CICS/OS/VS now fully supports the 31-bit addressing and extended virtual storage facilities of MVS/XA. This relief substantially follows our trend observations mentioned in the Analysis section.

To sum up CICS/VS's limitations, it is fair to say that an extremely thorough preparation and configuration planning period is required to install CICS properly. This chore is not helped by the mountain of documents that must be reviewed during this period. It is important to review all existing application programs to determine which programs will need to be rewritten and how much effort will be needed to rewrite them. Proprietary software investments must also be reviewed from the same perspective. A software review program is extremely important for users who want to move into the newer MVS and VM operating system releases.

■ OVERVIEW

☐ Terms & Support

Terms • license available on a monthly lease basis only; single-copy and multiple-copy DSLO (Distributed System License Option) rates are available.

Support • of the 5 versions of CICS, only 2 are currently supported under category A support contracts; category A provides a choice of 2 different service options: the monthly licensed program support charge (MLPSC) for single-copy installation and the monthly multiple licensed program support charge (MMLPSC) plan • the other versions of CICS are category C products, which means that no further product support is available; Central Programming support via Field Engineering is available at an hourly rate.

☐ Component Summary

Three versions of CICS are not actively supported by the development groups: CICS-OS Standard, CICS-DOS Standard, and CICS/DOS/VS Entry Level System. Of these, ELS is probably still among the most active at small installations. It supports a limited range of functions and is restricted to use on the 3270 display terminal. ELS is also very easy to modify and tailor. Much less communications know-how is required to operate with ELS than with CICS/VS. The VS versions of CICS are very modular. The modules are logically grouped into 7 component sections: System Management, which handles all task and storage management facilities; System Service, in which all terminal control is centered; System Monitoring, which offers trace and dump facilities; System Reliability, which provides restart and security features; System Support, which provides all system generation, initialization, and termination facilities; Intersystem Services, which control transaction routing; and Application Services, which include editing and mapping support utilities.

CICS/OS/VS (5740-XX1) • Version 1 Release 5.0, 6.0, and 6.1:

NA lcns	$1,785/$1,335 mo	$145/$232 serv

CICS/DOS/VS (5746-XX3) • Version 1 Release 4.1, 5.0, and 6.0:

NA	641/577	136/217

☐ Host Computers & Operating Systems

CICS/VS can be installed on any IBM System/370, 3000, 4300, or compatible computer that can support DOS/VS(E), VS1, MVS, MVS/XA, or VM/370. Version 1, Release 4 and earlier can also support SVS. The Entry Level System requires the DOS/VS operating system. The OS and DOS Standard versions of CICS can be installed on System/360 and 370 models in real memory mode. For DOS/VSE users, the CICS/VS/DOS system can be configured on the user's SIPO/E tape.

☐ Minimum Operating Requirements

Memory requirements for a CICS/VS configuration depend on the options selected and the number of terminals and buffers included in the design. Our estimate is that at least 125K bytes of real memory and about 100K bytes of virtual memory would be required to support a minimal system. Practically all SDLC and BSC

LCNS: only monthly licenses are available. MO: monthly license fees: first figure is the basic monthly license fee for a single-copy installation; second figure is the DSLO monthly charge for additional copies. SERV: the monthly support charges: the first figure is the single-copy support charge; the second figure is the multiple monthly license support charge. NA: not available. Prices are effective as of January 1985.

 ©1985 Data Decisions

IBM Corporation CICS (OS/VS & DOS/VS)
TP Monitor System

terminals that can be appended to the system are supported under CICS/VS.

☐ Access Methods

CICS/VS supports a wide range of IBM TP and file access methods. For DOS users, CICS/VS utilizes BTAM, BTAM-ES (for VSE users), and ACF/VTAM(E) to support terminal operations. OS/VS users can additionally employ TCAM, ACF/TCAM, and GAM. GAM is used to support communications to graphics terminals for charts and plots. The Intersystem Communications Facility runs in an SNA environment under either ACF/VTAM(E) or ACF/TCAM.

All standard IBM file access methods are supported under CICS/VS, including VSAM, ISAM, SAM, and BDAM. The DL/1 database language is supported in connection with IMS/VS and DL/1 DOS/VS database management systems.

☐ DBMS Interfaces

CICS/VS can be interfaced with IMS/VS or DL/1 DOS/VS systems by direct interface modules. In addition, regions and partitions in associated environments can be connected through the ISC link to allow partitions/regions in separate processors to communicate with each other. Most vendors of independently supplied DBMS products provide interfaces to CICS/VS.

■ CICS FACILITIES

CICS/VS is a general-purpose data communications interface between the operating system and application programs written in a high-level programming language. COBOL, PL/1, and assembler language programs are supported directly in both OS/VS and DOS/VS(E) environments. An interface for RPG II programs is also available for DOS/VSE users. CICS/VS permits the application program to invoke task and terminal functions in the host system and to interface with system services provided by the operating system. CICS/VS is a highly modular system that can be tailored through a macro language sysgen operation. The modules and components that make up the CICS/VS system are discussed in the following.

System Management • provides multitasking facilities and concurrent transaction processing; performs priority scheduling, transaction synchronization, and control of serially reusable resources • controls main storage allocation for CICS/VS, including acquisition, disposition, initialization, and request queuing • provides multiprogramming through dynamic program management; supports a real-time fetch action • time management routines are provided for system stall detection, runaway task control, and task synchronization; allows tasks to be initiated based on specific intervals of time or time of day; this facility can be carried over to other CICS/VS systems interconnected through the ISC facility and the Multi-Region Operation facility • supports terminal management by providing for communications between terminals and user-written application programs through a Terminal Control Program; provides for the coexistence of various access methods through the control program; automatic task initiation from the host and terminal-originated tasking are supported.

File & Data Management • provides data set support using direct or keyed access through VSAM, ISAM, and BDAM; supports updates, additions, random retrieval, and browsing of logical data; using VSAM only, the system supports alternate indexes, reusable data sets, relative record data sets, physical record deletion, read-only retrieval, mass record insertion, get previous record, and skip sequential processing • the High Performance Option (HPO) is available for MVS systems and provides support for VSAM Improved Control Interval Processing (ICIP); changes and access to data sets and DL/1 databases defined as recoverable can be logged automatically for use during emergency restart; HPO can also utilize the VTAM fast path feature with MVS • ISC and MRO allow for file and database sharing across connected systems • Transient Data Management provides an optional queuing facility for the management of data in transit to and from user-defined destinations; Temporary Storage Management provides an optional general-purpose scratch pad facility that allows an application program to temporarily store data in program storage or on a direct access device; this facility can be used for basic mapping support, terminal paging, message switching, etc; a Journal Management routine provides facilities to create, manage, and retrieve special-purpose sequential data sets earmarked for journal operations; both user-created and system-created data is logged to these journals • Synch-Point Management works with all other system functions to provide the necessary restart synchronization; resources can be backed out to supplement other restart operations upon abnormal termination; facility gives users the ability to back out to a previously-defined synch-point; all task and transaction information is logged, and rollback is accomplished using this information and the synch-point.

System Services • provides terminal operator security through sign-on/sign-off facilities; provides facility for MVS users to interface with Resource Access Control Facility (RACF) external security management program product; a Master Terminal Function provides dynamic user control of the overall system; operator can change the status and value of many parameters used by CICS/VS; operator can disable and/or terminate CICS/VS tasks • the Supervisory Terminal Function performs a subset of the services available to the master terminal operator; these functions are limited to terminals directly under the control of the supervisor; Operator Terminal Functions are limited to the actual operator of a specific terminal; all operator terminal requests are checked for validity and processed by the Master Terminal program • a facility exists to capture specific statistics, either requested or dynamically; all statistics are maintained in a sequential data set and are recorded at user-specified intervals; system and terminal usage is captured and can be printed in a detail or summary report by an off-line utility program • Asynchronous Transaction Processing (ATP) provides the capability to read and queue batched input from an appropriate device and to dequeue and write the resulting output data to an appropriate device; ATP is performed concurrently with other terminal activity • CICS/VS provides dynamic open/close operations during real-time execution; time-of-day control is provided to the master terminal operator; message switching is supported during real-time operations.

System Monitoring • Trace Management provides a programming debugging facility for CICS macro instructions, CICS/VS management and service programs, and user-written application programs; an auxiliary trace program provides the ability to record trace entries on sequential data sets and permits selective printing by a utility program; a Dump Management facility assists in the analysis of programs and transactions undergoing development or modification; specified areas of main storage are dumped onto a sequential data set for subsequent off-line formatting and printing; the CICS/VS dump facility is separate from the operating system and/or access method dump routines • CICS/VS monitoring facilities include an accounting routine that provides information on an individual user basis; the user chooses the level of information that is to be captured and recorded; all monitoring data can be written to the system's SMF (System Measurement Facility) files (in an OS/VS environment).

System Reliability • System Recovery Management provides for the interception of program interrupts and operating system abends to facilitate, if possible, the continued processing of a CICS/VS transaction; user exits can be used to attempt error handling; the Dynamic Transaction Backout (DTB) facility is used to perform online backout of the effects of a transaction while the rest of the CICS/VS system operates normally; the backed out transaction is abnormally abended; DTB provides the means for immediate recovery by backing out to the last user-defined synch-point or the start of the task that made changes to the CICS/VS environment; when DTB is active in the system, all backout operations are handled automatically; if not, backout can be initiated either by program or CICS/VS abend specification • Transaction Restart allows certain transactions that have been abnormally terminated and backed out by the DTB to be restarted; acts to prevent deadlock situations in a DB/DC environment; Emergency Restart allows the users to re-establish the operating environment to a pre-defined point in case the CICS/VS system abends; function is performed by specific system initialization modules invoked at the time; uses logged data to accomplish restart; user-written programs can be integrated into CICS/VS to handle program error, terminal/node error, and terminal/node abnormal condition situations.

 ©1985 Data Decisions

IBM Corporation CICS (OS/VS & DOS/VS)
TP Monitor System

System Support • includes the system generation (sysgen) operation; allows users to structure processing and database requirements; performed through the use of a macro language; a preassembled version of the full-function system, based on a sample system, is available; the environment definition is generated by creating system control and system service tables; the System Initialization Table parameters can be temporarily overridden by the master terminal operator; system termination operations can provide for information gathering to perform a warm restart • a program translator is provided for the High Level Programming (Command Level) interface, and a preprocessor is provided for CICS/VS macro instructions that may be included in a high-level application program; a full set of utility programs that back up the trace, dump, formatted dump, and system log/journal operations by generating reports and summaries is provided • an interactive process is also provided for defining groups of CICS transactions, programs, mapsets, partition sets, and profiles and the capability to dynamically add or alter these resources (PPT and PCT entries) on a running CICS system.

Intersystem Services • manages the sending and receiving of CICS/VS requests relating to resources on remote CICS/VS systems; requests can be shipped over an ISC link using SNA networking or between CICS regions using the MRO facility; the transaction routing feature routes messages between CICS/VS regions so that operators on terminals associated with one region can use transactions running in a connected region; transaction-to-transaction support provides the mechanism for a transaction on one CICS/VS system to converse with a transaction on a remote system over an ISC link.

■ USER INTERFACES

☐ Application Services

Basic Mapping Support • provides message routing, terminal paging, and device independence services; message routing allows application programs to send output messages to one or more terminals not in direct control of the transaction; terminal paging allows users to prepare output without regard for the physical size of the output terminal; device independence allows users to prepare output without regard for the required control characters and eliminates trailing blanks from each line.

Execution Diagnostic Facility • permits the interception of application program EXEC commands before and after their execution; allows the programmer to test an application program using EXEC commands in an online interactive manner at source level; programmer can step through the instructions in the application, making changes interactively where required.

Command Interpreter • display-oriented program designed to assist in the writing, syntax checking, and execution of an EXEC command; enables display operator to enter and execute command to CICS/VS for validity checking; missing or incorrect parameters are diagnosed; this facility can be used to generate test data for testing application programs.

2260 Compatibility • allows users to run currently operational 2260-based transactions from a 3270 display terminal; compatibility mode is specified by the user and directed toward transaction and terminal; operations can be mixed with 3270 native mode; full-screen or format-mode compatibility can be specified; in most cases, users are not required to change the application program.

Other Functions • available through the use of CICS/VS macro instructions; Table Search operations can be specified; a Phonetic Conversion routine converts a source name into a key based upon the phonetic sound of the name; the key can then be used to access a database name file; a Field Verify routine enables the contents of a data field to be verified as entirely numeric, alphabetic, or packed decimal data; the Bit Manipulation routine allows the high-level application program to test for a bit-on/bit-off condition and to branch accordingly; Field Editing allows users to remove alphabetic or special characters from numeric fields and to convert the results to EBCDIC or packed decimal format; Input Formatting converts free-form input from the terminal into a predefined fixed format; free-form input can be positional or keyword-oriented; the Weighted Retrieval facility allows users to search a specified group of records on a VSAM data set on the basis of fixed and/or variable selection criteria.

FASTER Language Facility

The FASTER Facility (5740-XX1/02 and 5746-XX3/02) is a category C option that operates as a feature of the CICS/VS system. It permits multiple FASTER Transaction Processing Descriptions (TPDs) to be run under CICS/VS. This feature consists of a set of language macros and processing routines that are designed as a conversion aid for users of the 5 FASTER systems. FASTER III and FAST LC users with CICS/VS can realize additional terminal support, native mode VSAM support, and full multithread operations. Added terminal operator password security is also provided. Only a single-copy license is given in the following because FASTER feature is a Class C product. Support is available only on-site at Field Engineering hourly rates.

FASTER/CICS/VS-OS:

NA lcns	$120/NA mo	NA/NA serv

FASTER/CICS/VS-DOS:

NA	113/NA	NA/NA

Extended Telecommunications Module (EXTM) V.3/R.1

EXTM (5746-XXB) is another product that is available only with category C support. It supports CICS/VS-DOS terminal applications communications for pre-SNA terminals in an SNA environment. It contains all the facilities for data flow support and uses the functional capabilities of 3704/3705 NCP/VS for terminal support. EXTM can coexist in the same partition with BTAM and requires DOS/VS R.34, NCP/VS V.5 or later, along with CICS/VS-DOS V.1/R.5. EXTM also requires a 3704/3705 or 3790 controller with LCA. Multiple 3704/3705 configurations can be supported, along with most remote facilities available under NCP/VS. Most SDLC, BSC, start/stop terminals, and locally attached 3740s are also supported. As with the FASTER facility, EXTM is available on a monthly license basis only, and only with Field Engineering support on an hourly basis:

NA lcns	$250/NA mo	NA/NA serv

Screen Definition Facility (SDF) CICS

SDF/CICS/VS-OS (5740-XYF) and SDF/CICS/VS-DOS (5746-XXT) are program products that can be used to augment the basic mapping support (BMS) facility of CICS/VS, and to provide a full-screen editing capability for maps and map sets with a maintenance library. It supports all extended attributes (color, highlighting, etc) on the 8775 color terminal, and supports online definition and editing of new maps and map sets for multiple devices. Multiple maps can be organized into pages through the full page definition/editing facilities. Maps expressed in CICS/VS BMS can be converted to SDF/CICS/VS formats through a batch utility. Another utility supports SDF/CICS/VS conversion from online to batch mode. All build operations are supported by an online error-help tutorial interactive dialog. The OS/VS version runs under the VS1, MVS, and MVS/XA operating systems. The DOS version is available only to DOS/VSE users.

SDF/CICS/VS-OS:

NA lcns	$297/$223 mo	$47/$75 serv

SDF/CICS/VS-DOS:

NA	221/165	44/70

Development Management System/CICS/VS (DMS/CICS/VS)

DMS/CICS/VS-OS (5740-XC5) and DMS/CICS/VS-DOS (5746-XC4) are supplementary program products that are used to simplify the implementation of online information systems using the 3270 CRT display terminal as the input and display terminal. DMS/CICS/VS replaces the older DMS/VS (Display Management System/VS), and provides users with an interpretive system that utilizes screen prompting menu-selection as prime interactive development aids. With the Application Generation feature, users can design specific applications that can access local or database files. Special forms are used to create and control both the user applications and system-supplied utilities. The Panel Description Form defines

 ©**1985 Data Decisions**

IBM Corporation CICS (OS/VS & DOS/VS)
TP Monitor System

the processing sequence of operator responses, the routing of messages, the location of static fields on a display panel, and the locations and types of the variable display fields. Calculation and edit statements are used to perform arithmetic operations, data editing, and alteration of processing flow without having to employ user-coded exits.

The File Description Form describes a file or group of files and the format of the records in the file. The index file structure for indexed files is also defined on this form. The Data Transfer Form specifies the files, file fields, and batch functions such as file-to-file update.

Some of the facilities available with DMS/CICS/VS include: the ability to add or update DL/1 databases (both IMS/VS and DL/1 DOS/VS); a Multiple Panel Update/Add Option (DOS system only), which can capture data from a set of up to 16 logically connected panels and can construct from this data a single logical file record or a single database path for each 1 of up to 4 files or databases; ISC support by way of DMS screen applications; support for RPG II user exits (DOS system only); calculation statement looping; an online diagnostic facility; performance monitoring data capture; transaction ID switching; and a facility to interface with the Data Dictionary component to process fields present in DL/1 segments.

A basic DMS/CICS/VS system, without buffer space, requires a minimum of 30K bytes of real memory. Buffer adds about 2K bytes per line and 600 bytes per terminal.

DMS/CICS/VS-OS:

NA lcns	$319/$238 mo	$51/$82 serv

Application Generation Feature-OS:

NA	434/324	51/82

DMS/CICS/VS-DOS:

NA	179/134	51/82

Application Generation Feature-DOS:

NA	268/200	51/82

■ USER REFERENCE LIST

It is IBM's operating policy not to make available a list of users of its software or hardware products; therefore, we are not able to present a reference list with this report.

• END

©1985 Data Decisions

IBM 3101 Display Terminals

■ PROFILE

Function • general-purpose nonprogrammable interactive keyboard-display ASCII terminal; TTY 33/35 operation in character transmission mode.

Architectures Supported • any architecture supporting asynchronous ASCII protocol • local/remote attachment to IBM S/370, 303X, 4300, 8100, Series/1 hosts.

Communications • S/370, 303X, 4300 host DOS/VS, DOS/VSE, OS/VS1, OS/VS2(SVS/MVS), VM/370 environments under applicable CICS, BTAM, TCAM, VTAM, ACF/TCAM, ACF/VTAM support • 8100 host DPPX/BASE environment as TTY 33/35 terminal • Series/1 RPS, EDE, CPS environment as TTY 33/35 terminal • half-/full-duplex, asynchronous, 110- to 9600-bps, point-to-point, character/block mode transmission • EIA RS-232C, RS-422A, 20-mA current-loop communication interfaces.

Operating System • none.

Database Management • none; only in association with host facilities.

Transaction Processing Management • none; only in association with host facilities.

Support Software • none; only in association with host facilities.

Processor • display-oriented control and communications logic only.

Terminals/Workstations • single keyboard 1920-character display with auxiliary port for local printer or peripheral.

First Delivery • 1979.

Systems Delivered • unknown.

Comparable Systems • competitive with number of general-purpose ASCII display terminals; most notable are ADDS Regent 60, Hazeltine 1400/1500, Lear Siegler ADM, Beehive DM, DEC VT-100.

Vendor • International Business Machines (IBM) Corporation, Information Systems Group • National Accounts Division; 1133 Westchester Avenue, White Plains, NY 10604; 914-696-1900 • National Marketing Division; 4111 Northside Parkway, Atlanta, GA 30327; 404-238-2000.

■ ANALYSIS

During August 1984, IBM withdrew 5 3101 models from its 3101 product line. The remaining model, Model 23, has been ergonomically enhanced and renamed the Model 881. The 881 enhancement is a new low-profile keyboard that is adjustable to 6, 12, or 18 degrees of inclination and supports the same key arrangement as on the former keyboard. In addition, The T16004 serial interface matrix printer is now available for the 3101 on an RPQ basis.

Similar to other ASCII display terminals, the 3101 offers a 1920-character 24-line x 80-character screen capacity, EIA- and TTY-type interfaces, and selectable half-/full-duplex data rates of 110 to 9600 bps. Other features common to this class of terminal include a keyboard module with separate numeric keypad; upper-/lowercase 128 ASCII character set display; and character/block transmission mode. Since its initial release in 1979, the 3101 has retained a stable position in the ASCII terminal marketplace. However, the discontinuation of 5 3101 models reveals IBM's intention to eventually remove this aging product from the market. The demise of the 3101 Display Terminal will most likely occur once the IBM 3270 Series fully supports ASCII terminal handling.

□ Strengths

Internal hardware diagnostics offered with the 3101 allow the user to isolate display/keyboard logic problems, and to perform self-repair by use of various logic, video, or keyboard modules. Another beneficial feature is the ability via a front keyboard panel to switch-select various operating parameters during initial setup (half- or full-duplex operation, data rate, end character, parity, stop bit, etc). A tilt/rotate display also provides for operator comfort.

□ Limitations

The 3101 can be configured with a locally attached printer which can print data sent from the host. This is a beneficial feature except that in block mode, the operator is unable to key data during the printout. Unfortunately, this capability is lacking. Upward expandability (start "dumb" and end "smart") available on some other display makes via plug-in logic or peripherals, can also be viewed as a handicap in some end-user applications.

When attached to a modem, the 3101 is limited to a maximum data rate of 1200 bps, a severe limitation.

■ COMMUNICATIONS FACILITIES OVERVIEW

Operation as general-purpose half-/full-duplex asynchronous ASCII display terminal at rates up to 9600 bps. Operation online in point-to-point keyboard-to-line/display, line-to-display, line-to-printer; display/buffer-to-line and line-to-buffer/display in block mode. Off-line keyboard-to-buffer/display in block mode. Local mode keyboard-to-display for operator training and terminal self-diagnostics.

In IBM environments, supported via direct (modem-less) or remote communications line (modem) facilities via 2701 data adapter or 3704/3705 front end on S/370, 303X, and 4300 hosts under DOS/VS, DOS/VSE, OS/VS1, OS/VS2(SVS), OS/VS2(MVS), or VM/370 and applicable BTAM, TCAM, ACF/TCAM, VTAM, or ACF/VTAM support. Supported direct or

 ©1985 Data Decisions

IBM 3101 Display Terminals

remote as TTY 33/35 via RS-232C interface on 8100 host under DPPX/Base, and via RS-232C or 20-mA loop interface on Series/1 host under RPS, EDE, or CPS.

■ HARDWARE

☐ Terms & Support

Terms • 3101 Display Terminal available on purchase-only basis with quantity discounts • discounts available for units purchased within 18-month periods are 7.5% for 25 to 49 3101 displays; 15% for 50 to 99 3101 displays; and 20% for 100 or more 3101 displays.

Support • 3101 is designed for customer setup, diagnostics, and self-repair • IBM suggests spare terminals and/or logic, video or keyboard modules for multiterminal facilities; otherwise, defective terminal returned to IBM repair center • maintenance plans include repair center service with parts extra, repair center service with parts included under annual contract or on-site service with replacement parts (elements) included • time and material plan also available for one-time service • warranty coverage of 90 days • maintenance shown in this report is for on-site service and replacement parts.

☐ Overview

The IBM 3101 Series consists of an ASCII keyboard-display terminal designed for general-purpose operations at up to 9600 bps via RS- and/or TTY-type interfaces. The Model comprises a central 12-inch 1920-character display-logic module and a cable-attached modular keyboard.

Model Package

AAS 881 3101 Model 881 • keyboard-display terminal with switch-selectable RS-232C/RS-422A communications interface; auxiliary RS-232C peripheral interface; switch-selectable character/block transmission modes:

$1,650 prch	$190 maint

Keyboard Palmrest • increases the total depth of the front-end palmrest area of the 4101 keyboard from 25 millimeters to approximately 85 millimeters:

NA	NA

☐ I/O & Communications

The IBM 3101 Display Terminal supports point-to-point asynchronous ASCII communications at switch-selectable rates of 110/150/200/300/600/1200/1800/2400/4800/9600 bps. Switched or nonswitched line data rates depend upon line conditioning and the use of non-IBM modems or multiplexers. If RS-232C and modem are used, the terminal transmits at 110 to 1200 bps; all other interfaces handle 110 to 9600 bps.

Switch setups within the 3101 also provide for half-/full-duplex mode operation; for space/mark/even/odd parity; for 1/2 stop bit character framing; for permanent/controller request-to-send (RTS); for ETX/CR/EOT/XOF end character; and for activating reverse channel operation.

PRCH: single-unit purchase price. MAINT: annual Repair Center Service maintenance with machine element replacement. NA: not applicable/available. Prices are current as of January 1985.

The 3101 includes a single RS-232C (CCITT V.24/V.28) communications interface. A choice of RS-232C/RS-422A (CCITT V.11) interfaces is available. The 3101 also comes equipped with a second RS-232C auxiliary interface for local peripheral device attachment.

The 3101 offers switch-selection of character/block transmission modes. Block size can range up to full screen capacity of 1920 characters plus additional codes.

Direct host attachment in local processing facilities is possible without employing modems. For the 3101 RS-232C or 20-mA loop interfaces, the terminal may be attached at distances of up to 40 feet and support data rates to 9600 bps. For the RS-422A interface with shielded cable facilities, distances up to 4000 feet at 9600 bps may be supported without modem assist.

5640736 Modem Cable • 10-foot modem cable for 3101 • required for IBM 8100 direct connect:

$65 prch	NA maint

IBM Host Attach

Direct or communications line connection of the 3101 to IBM S/370, 303X, and 4300 hosts is possible via the 2701 data adapter or 3704/3705 communications controllers. IBM 8100 attachment is via asynchronous RS-232C port on the host as TTY 33-/35-type character transmission mode terminal. IBM Series/1 attachment is via RS-232C or 20-mA loop host port as TTY 33-/35-type character mode terminal.

☐ Terminal/Workstation

Configuration • tabletop keyboard display with modular keyboard • 87-key typewriter-style keyboard with separate numeric key cluster and 8 program function keys; generates 128-character ASCII set • displays 95 graphic character set; 52 upper-/lowercase alphabetics; 10 numeric; 32 special characters plus space; 33 control characters when in transparent mode • ISO format keyboards and sets available.

Display • 12-inch diagonal • tilt and swivel • 7x14 matrix • 1920 characters at 24 lines x 80 characters with 25th status indicator line • 95/128 ASCII sets; ISO sets available • switch-selectable blink/nonblink cursor, reverse video, upper-/lowercase • display tilt/rotate.

Edit & Format Features • auto-repeat keys • cursor up, down, left, right, home, tab; backtab; switch-selectable auto-new line, auto-line feed, return/return-line feed, scroll • cursor address read/write • erase to EOL/EOF; clear, clear input • protected fields • blink, intensity, back tab, delete character nondisplay attributes • send/print line, page, message.

Peripherals • auxiliary RS-232C interface supports local device attachment • data transfer from display or from network to peripheral attachment.

☐ Printer

The auxiliary RS-232C peripheral port supports attachment of a serial ASCII printer, supplied by IBM or other vendors.

• END

©1985 Data Decisions

IBM 3270 Series
Information Display System

■ PROFILE

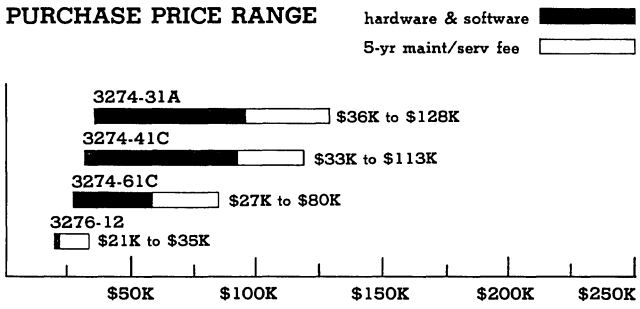
Function • standalone and cluster display terminal system employed in inquiry/update, data entry, program development, graphics, and local personal computing • all processing and database services handled by host computer unless personal computer option is employed.

Architectures Supported • used with IBM S/360, S/370, 3030, 3081, 4300, 8100, and S/3 processors • 3790 Communications System supported by 3276 control unit • S/370, 4300, and 8100 function under SNA/SDLC architecture • S/360, S/370, 4300, and S/3 operate under BSC • 8100 loop local architecture supported by 3274-51C and 61C • local attach via I/O channels, integrated adapters, direct loop or communication channels at rates up to 650K cps • directly attached 8100 loops operate at 9600 or 38,400 bps under SDLC • remote attach by nonswitched private or switched dial-line communication facilities in BSC/SDLC half-duplex at rates up to 9600 bps for BSC and 56K bps for SDLC.

Communications • CICS/VS under ACF/VTAM/VTAME/TCAM for OS/VS and DOS/VS • IMS under BTAM and ACF/VTAM • single link, dedicated line at 1200/2000/2400/3600/4800/7200/9600 bps, half-duplex over half- or full-duplex facilities, BSC or SDLC • Models 51C and 61C operate half-duplex over switched facilities at 1200/2400/4800/9600 bps • all operate at speeds up to 56K bps, point-to-point and multipoint where facilities exist • Models 51C and 61C operate in half-duplex mode at 9600 or 38,400 bps over direct attach loop, and 2400/4800/9600 bps over data link attached loop • X.21 supported by Models 41C, 51C, and 61C under SDLC at speeds of 2400/4800/9600 and 48K bps • X.25 supported by 31C, 41C, 51C, and 61C at 9600 bps • ASCII/EBCDIC codes • RS-232C interface; DDS and CCITT V.35 interface optional • integrated 1200-bps modem for dedicated line standard; higher speeds optional.

The 3270 permits up to 32 users to simultaneously access host facilities. While designed primarily for inquiry/update applications, users may attach personal computers to off-load processing from the mainframe.

PURCHASE PRICE RANGE



IBM 3270 SERIES PURCHASE PRICING bar graphs cover price ranges between "small" and "large" configurations for hardware products (solid bars) and for associated 5-year period maintenance (open bars) • 3274-31A **small** system consists of a controller with 8 channel adapters, an integrated diskette, 4 Model 3178-C20 keyboard/displays, three 3180 Model 1 keyboard/displays, and a 3287 Model 12 printer; **large** configuration consists of basic controller with 16 additional channel adapters, integrated diskette, 8 Model 3178-C20 keyboard/displays, eight 3180 Model 1 keyboard/displays, 3 Model 3179 displays and associated keyboards, 2 Model 3287-12 printers, a Model 3287 Color Printer, and a Model 3262 Line Printer • 3274-41C **small** system consists of a controller with 8 channel adapters, integrated diskette, 4 Model 3178-C20 displays, two 3180 Model 1 displays, and a 3287 Model 12; **large** configuration consists of basic controller with 16 additional channel adapters, integrated diskette, 8 Model 3178-C20, eight 3180 Model 1 displays, 3 Model 3179 displays and keyboards, two 3287 Model 12, a 3287 Color Printer, and a Model 3262 • 3274-61C **small** system consists of a controller with 16 channel adapters, integrated diskette, 4 Model 3178-C20 displays, two 3180 Model 1 displays, and a 3287 Model 12; **large** configuration consists of basic controller plus integrated diskette, 8 Model 3178-C20 displays, 3 Model 3179 displays and keyboards, two 3180 Model 1 displays, two 3287 Model 12 displays, and 3287 Color Printer • 3276-12 **small** configuration consists of basic 3276-12 keyboard/display controller, 4 additional channel adapters, 2 Model 3178-C20 displays, two 3180 Model 1, and a 3287 Model 12; **large** configuration consists of basic unit plus 7 additional channel adapters, 4 Model 3178-C20, 2 3180 Model 1 displays, and a 3287 Model 12 • all prices shown in bar graphs reflect single-quantity purchase prices; the actual prices will be lower since the vendor offers quantity purchase price discounts.

Operating System • service through host processor under DOS, DOS/VS, DOS/VSE, OS, OS/VS, VM/370.

Database Management • none; only in association with host IMS/VS and CICS/VS facilities.

Transaction Processing • primarily through CICS or IMS which acts as terminal-oriented transaction monitor with file processing facilities • supports send/receive batch and inquiry tasks.

Support Software • supported by and employs software and program facilities of host processor • no local independent (from host) off-line programming/processing capabilities • system diagnostics checks DTE and DCE.

Terminals/Workstations • up to 32 CRTs and printers per cluster.

First Delivery • 1971 to 1984 dependent on specific coniroller, display, printer model, or component.

Systems Delivered • over 1,000,000 (terminals).

Comparable Systems • emulated by large number of PCMs; most prominent systems are Davox 100, 2000, and 5000, Lee Data 300/400, NCR 7950, Harris Challenger Series, ITT Courier 270 and 9000 Series, Memorex 2070, Telex 270, MDS 9000 Series, and Braegen Elan • other manufacturers offer replacement

 ©1985 Data Decisions

IBM 3270 Series
Information Display System

display or printer models compatible with 3270 control units.

Vendor • International Business Machines (IBM) Corporation, Information Systems Group • National Accounts Division; 1133 Westchester Avenue, White Plains, NY 10604; 914-696-1900 • National Marketing Division; 4111 Northside Parkway, Atlanta, GA 30327; 404-238-2000.

Canadian Headquarters • IBM Canadian Limited; 3500 Steeles Avenue East; Markham, ON L3R 2Z1 • 416-474-2111.

Distribution • worldwide via local IBM sales/service offices; also marketed in conjunction with IBM S/3 processors.

GSA Schedule • listed.

■ ANALYSIS

The 3270 is now in its 14th year of production, and remains one of the most widely used and emulated product lines on the market. And for good reason; it is an effective vehicle for sharing resources in a clustered terminal environment.

In the 3270 marketplace, IBM competes with 15 primary vendors offering some 78 products (see report 0722). For the most part, competitive offerings are replacements for the 3274/3276 controllers and/or the 3178, 3179, 3180, 3278, and 3279 terminals. In addition to these primary vendors, a new breed of competitor called protocol converters has surfaced in the past few years that offers a 3270 alternative in the form of product emulation and protocol conversion (see report 737). These emulators/converters are generally priced far below comparable IBM products, and permit low-cost ASCII terminals and printers to be used in lieu of the higher-priced 3270 products.

Another level of competition comes from the marriage of personal computers and device emulator. Here, a PC is fitted with firmware/software that allows the unit to "appear" to be a 3270 controller with an attached 3270 terminal. This combination allows users to access an IBM host to avail itself of its services, yet provides local autonomous processing services. For the most part, this PC/emulator combination is used for remote sites that cannot justify the cost of a 3270 system.

While the aforementioned protocol converters might eventually become strong 3270 competitors, the primary vendors still present the greatest challenge to IBM. Companies like ITT Courier, Telex, Lee Data, Harris, MDS, and Davox all offer strong—and in many cases—inventive products. One of the most innovative vendors is Lee Data. It was the first to offer a multihost communication facility; an "all-in-one" terminal emulating all of the display characteristics of the IBM 3278-2 through -5; plus the capability to switch from asynchronous to 3270 mode via a single terminal. While IBM now offers a comparable all-in-one product in the form of the 3180, it has yet to respond to Lee Data's other innovations.

While innovation might establish a reputation, it doesn't necessarily guarantee market domination or, for that matter, large market share. Price and compatibility do. ITT Courier, second only to IBM in market share, sells its products based on price plus a solid reputation for product reliability and service. Telex, Memorex, and Beehive also sell on these tenets, plus true **plug compatibility** with IBM. Any Telex 270 Series controller/terminal/printer, for example, will work with IBM products. For example, a Telex 278X terminal (a 3278 replacement) will plug into a 3274/3276 controller. Likewise, a Telex 274 controller will interface 3270 terminals.

The marketing strategy behind plug compatibility is two pronged. First, it provides the vendor with the opportunity to replace 3270 systems with absolutely no modification to the user's operations. Second, it expands marketing opportunities by replacing individual components of the 3270. With most IBM competitors, such piecemeal replacement is **not** permitted. ITT Courier and Harris, however, have modified their stance on this issue by announcing true plug compatibility. The Harris Challenger is allegedly plug compatible at every level, and the new ITT Courier 1778 will attach to a 3274/3276 as a 3178 replacement.

With several companies offering plug-compatible products, end users should prepare themselves for a round of "bare knuckles" marketing. Here, vendors increase market share by capturing other vendors' customers through, among other things, price slashing. While end users will benefit from this coming war by paying less for products, many of the smaller or less financially stable companies will not survive. We all lose when that happens.

As for IBM's plans for the 3270, it would not be surprising if IBM furnished a multihost addressing controller, and a terminal that facilitated switching between asynchronous and 3270 modes. IBM recognized the importance of ASCII handling when it introduced the 7171 Control Unit late last year. The 7171 attaches to a local 43XX or 308X block multiplexer channel, and emulates 1 or 2 IBM 3274D control units to the host processor. Up to 64 ASCII devices operating at rates ranging from 300 to 19.2K bps can attach to a 7171.

The multihost addressing facility, first introduced by Lee Data and now available with Harris and Telex units, allows the user to access different hosts at the same or different locations. Undoubtedly, IBM would rather sell a separate controller for each host, but it realizes that the multihost feature will become inevitable as companies move towards distributed processing. IBM might even do the competition one better by allowing peer-to-peer addressing at the controller level.

□ Strengths

While the 3270 has long enjoyed a prominent position in the marketplace, IBM has had to significantly enhance the product over the past few years to retain its market position. For example, the 3274 C models can interconnect to X.25 public data networks; the protean 3180 was introduced to satisfy the needs for extended data formatting; and a response-time monitor was added to increase communication efficiency.

The 3180 is an extremely versatile terminal, allowing users to switch between 80-/132-column formats directly from the keyboard. This terminal incorporates all of the functionality of the current 3278 Models 2 through 5, yet is priced between Models 4 and 5. The ability to switch column formats makes the product very attractive to those needing both conventional 80-column display format, and the facility to handle 132-column applications like spreadsheets. It also allows users to view a typical 132-column printing line before the actual print operation.

Users of the 3180 will also benefit from its 7680-character scroll buffer. With it, vertical scrolling can be performed **without** intervention from the host processor. The 3180 also has a record/playback function that allows up to 96 keystrokes to be saved and recalled on command.

Another enhancement to the 3270, also implemented via the 3180, is a local print capability. Users can transfer data from the screen **directly** to a cluster-attached printer **without** host intervention. While local printing is a significant improvement, a 3180 printer interface for direct printer attachment, such as offered by the competition, would be an even greater improvement.

The X.25 allows Models 31C, 41C, 51C, and 61C cluster controllers to interface with the many X.25 data services now on the market. Transfer speeds are 9600 bps. IBM is no stranger to the X.25; it has been offering this service to Canadian customers and some U.S. Government agencies for about 5 years. If it follows the same conventions with this version, the SDLC message frame is wrapped in an X.25 envelope.

Another communication enhancement, offered with 3274 controllers, is a response-time monitor. Basically this facility measures and records the transaction time between an inbound host attention and user-defined transaction end. This facility should benefit users who need to be alerted to degrading or poor response time. Currently, Lee Data, Telex, and Davox have similar facilities.

The 3270 is one of the few products in its class to offer high-level data protection. Through an encryption/decryption facility, data transmitted between systems employing 3274/3276 controllers are encoded via a combination of hardware and software. The encryption technique itself is an IBM implementation of the Federal Data Encryption Standard (DES). Two additional security features are a keylock facility and user identification card reader. The latter can be used to establish an audit trail and/or billing.

 ©1985 Data Decisions

IBM 3270 Series
Information Display System

A personal computer option supports the 3270 as an intelligent workstation. This upgrade appeals to users that are now demanding facilities for local processing and file transfers. In addition, users can take advantage of the mountain of application packages now readily available for the 5150 personal computer and 3270 PC.

For distributed users, the 3270 offers 2 features which speed communication. The first is the ability to concurrently transmit and receive messages; the second is broadcast polling. With the latter, the local control unit may generate a poll instruction which interrogates all attached terminals. This greatly reduces polling overhead and optimizes the use of the communication line.

The ability to simultaneously send and receive messages optimizes the high-speed link through full-duplexing. Unfortunately, this facility can only be implemented when 2 or more SDLC devices are multidropped and attached to 3704 or 3705 front ends.

Another strong point of the 3270 is its diagnostic software. With it the user can check the operation of the local components (DTE) and to a degree the integrity of the high-speed link (DCE). The latter is accomplished via interface check (local and remote) test messages generated at the host, and the logging of line error statistics. Further DCE link tests, of course, can be initiated via the modem's diagnostics.

☐ Limitations

While a multihost communication facility may be on the horizon, the 3270 does not offer it, while Lee Data and Harris do.

There are a few alternatives to IBM's single-host attachment restriction, however. The first is to attach IBM's relatively new X.25 interface to the 3274 controller. This allows the user to connect to the packet-switched networks like Telenet or Tymnet and, theoretically, to any computer attached to these networks.

The second alternative involves employing personal computers with an auxiliary EIA RS-232C interface that supports a dial-up modem. Users then can merely switch from 3270 mode to personal computer mode, dial the target computer, and begin communication. This approach is similar to that employed by Davox.

While IBM's personal computer support is a strong move (especially with the 3270 PC), no means exist for sharing the personal computer among many users. Sharing is attractive for a number of reasons. First, personal computers are expensive and the cost multiplies as additional users obtain them. Second, since the 3270 PC emulates 3278/3279 terminals, a fair amount of time the personal computer may not be used in its native mode. Davox's solution to this inefficiency is to attach a personal computer to a cluster controller port, and allow all attached terminals to share it. Obviously, this facility will prove unacceptable to users with heavy personal computer requirements. However, for those occasional users, it makes sense.

The facility for handling remote dial-up terminals surfaced a few years ago when it was introduced by one of the protocol converter vendors. It proved to be the right product at the right time, judging by its sales success. This facility allows users remotely located from the cluster controller to dial-in and obtain the same services as a locally attached terminal. As more and more remote terminals and personal computers come into play, dial-up support will become mandatory.

IBM supports remote dial-in with its Model 7171 controller, used to interface asynchronous terminals to the 43XX and 308X processors. It should also be added to the 3270.

Neither IBM nor its competitors permit peer-to-peer addressing on a local level. Thus all transactions must be handled by the host processor. IBM may be taking steps to eliminate this restriction via its recently announced SNA LU6.2 protocol. LU6.2 allows program-to-program communication between all network nodes, including host-to-host, peripheral-to-peripheral (such as Displaywriter-to-Displaywriter, and host-to-peripheral). Currently, LU6.2 is available in 5 SNA programs: CICS, System/38, Displaywriter, Scanmaster I, and the 5520. Hopefully, it will be extended.

When up to 32 devices are operating online, every bit of the available bandwidth must count. A data compression capability provides such a service by eliminating unnecessary data such as zeros, blanks, and redundant characters. The 3270 could certainly benefit from this capability.

A final limitation of the 3270 is its inability to store locally, frequently used screen formats. Each time a format must be changed, the user must invoke a request to the host. This wastes host resources and increases delays and communication costs. Telex provides a local format facility.

■ COMMUNICATIONS FACILITIES OVERVIEW

☐ Distributed Communications

The S/360, S/370, 3030, 3081, and 4300 operate under BTAM, BTAM-ES, TCAM, ACF/TCAM, VTAM, ACF/VTAM, ACF/VTAME, EXTM.

BTAM and BTAM-ES (Basic Telecommunications Access Method and BTAM Extended Support) provides control for data transfer between processor storage and local/remote BSC 3270 terminals. It also provides the application program with macros assembled into routines, inline instruction and linkages, and control blocks and tables used in defining lines, terminals, and other options to be used.

BTAM & BTAM-ES • support facilities for generating channel programs; starting I/O operations; handling attentions; handling line interrupts; and performing error recovery, posting, and counting • allows user to route data into display/printer buffer; to erase buffer and write data; to erase all unprotected fields in buffer; to read data from buffer or specified buffer location; and to read modified field from buffer or specified buffer location • under DOS and OS, support only provided for 1920-character buffers under local 3274 terminals; full compliment of buffer sizes are supported under remote BSC 3274/3276 attachments, however • BTAM-ES accommodate all buffer sizes under DOS/VSE or on 4300 Series processor.

TCAM & ACF/TCAM • controls transfer of messages between TCAM and application programs, and provides high-level message control language • macros used to construct message control program that controls messages between local and remote stations and application • ACF/TCAM offers optional multisystem networking feature; TCAM runs under OS and OS/VS; ACF/TCAM operates under OS/VS • TCAM macros support 1920-character buffers • ACF/TCAM supports all buffer sizes (up to 3,564 characters), but will not support 3274 local SNA attachments.

VTAM • operates with 3704/3705 in local or BSC/SDLC environments • establishes, controls, and terminates access between application programs and devices, and permits applications to share lines, controllers, and devices • controls movement of data between application programs and devices, and provides facilities which allows communications network to be monitored and altered.

ACF/VTAM • extends VTAM support by altering size of buffer pools to meet traffic loads; buffer sizes ranging from 480 to 3,564 characters (except under DOS/VS) supported • paces flow of messages between application programs and logical units • permits flow of data between interconnected communications controllers without having to pass through host attached to intermediate controllers • provides tuning statistics function that permits dynamic accumulation of data about I/O interface to local communications controller or 3790.

ACF/VTAME • supports Communications Adapter of 4331 processor and for various channel-attached devices, and provides key ACF/VTAM/NCP/VS functions including multiple-domain networks • supports extensions to 3270 data stream, permitting extended color, extended highlighting, programmed symbols, and structured fields.

EXTM (Extended Telecommunications Modules) • feature of CICS/DOS/VS provides linkage between CICS/DOS/VS and communications network • establishes, controls, and terminates communications between CICS/DOS/VS application programs and terminals; transfers data between application program and

 ©**1985 Data Decisions**

IBM 3270 Series
Information Display System

terminals; and monitors/alters network • operates with SNA and some pre-SNA terminals, and supports BSC or SNA/SDLC • buffer sizes supported by EXTM range from 480 to 3,440 characters.

☐ Distributed Configurations

The 3270 is made up to 3 components—control unit, associated display terminal(s), and associated terminal printer(s). Cluster configurations of the 3270 are built around 3274 Control Units or 3276 Control Unit Display Station. These controllers provide control, buffer, and multiplexing capabilities for a cluster of other directly attached 3270 family display terminals and printers, which include 3178, 3180, 3277, and 3278 Display Stations; 3179 and 3279 Color Display Stations; 3290 information panel; 3262, 3268, 3287, 3289, and 5210 printers.

Each 3270 controller or terminal has, in turn, a number of model options that allow display system to be tailored to specific requirements of user and host processor. Dependent on host system and 3270 controller option, local, remote, or loop attachment facilities are provided. BSC and SDLC remote communications protocols at rates of up to 56K bps are provided. The following outlines the display cluster maximums of the 3270 and the processors to which they may be attached.

3274-Based Clusters • clusters 8 to 32 terminals (3178/3180/3277/3278 displays, 3179/3279 color displays, 3287 printers, and 3289 line printers) • up to 31 3290s; each require 1 physical port and up to 5 logical addresses depending on screen partitioning (see 3290 description) • local/remote attachment to IBM S/360 Models 30, 40, 50, 65, 75, and 195; any S/370; any 3030 or 3081; and any 4300 • remote and direct loop attachment to any 8100 • remote and local communications channel attachment to S/3 Models 4, 8, 10, 12, 15, and 15D • BSC to 9600 bps; SDLC to 56K bps • up to 32 Model 6580 Displaywriter Systems with no associated printers may also be attached; supports up to 16 Displaywriters with printers • supports up to 32 3270 Personal Computers.

3276-Based Clusters • clusters of up to 8 terminals (integral 3276 display plus 3178/3280/3278 display, 3179/3279 color displays, 3262, 3268, 3287, and 3289 printers) • local/remote attachment to the IBM S/360 Models 30, 40, 50, 65, 75, and 195; any S/370; any 3030 or 3081; and any 4300 • remote and direct loop attachment to any 8100 • remote and local communications channel attachment to S/3 Models 4, 8, 10, 12, 15, and 15D • BSC/SDLC to 9600 bps • accommodates up to 7 Model 6580 Displaywriter Systems with no associated printers; up to 3 Displaywriters with printers; or up to seven 3270 Personal Computers.

☐ Distributed Utilities

IBM S/360, S/370, 3030, 3081 & 4300 Processors

DEMF (Display Exception Monitoring Facility) • provides for network problem determination and isolation in BSC mode under OS/VS.

DIDOCS (Device Independent Display Operator Console Support) • provides uniform services for all displays on OS and OS/VS systems • DIDOCS establishes linkage between displays and systems allowing displays to function as operator consoles; provides for processing and routing of messages from operating system or application program to console in multiconsole environments; and extends such support to 3270 printers operating as output-only hardcopy consoles.

NPDA (Network Problem Determination Application) • provides for network problem definition and isolation in BSC/SDLC modes under VTAM or TCAM.

SDS (Status Display Support) • provides system status display services for both display and nondisplay consoles.

IIS (Interactive Instruction System) • provides interactive online training capabilities for 3270 database/communications systems users under IMS/CICS/TCAM.

SLR (Service Level Reporter) Version 2 • monitors and reports level of service provided users • reports system and subsystem availability • provides performance data such as processor utilization, paging, channel load related to IMS/VS, CICS/VS or TSO response times or transaction load • provides data on utilization channels, DASD, tape and printers • operates on 3276 Models 2, 3, 4, 12, 13, or 14; 3277-2; 3178; 3278-2, -3, -4, or -5; 3279-2A or -3A.

IBM 8100 Processors

DSC (Data Stream Compatibility) • provides direct communications between displays or printers and 8100 via local/remote loops, direct-loop attachment, or remote links and host 370.

■ SOFTWARE

The 3270 operates under control of local/remote host processor software; the following briefly summarizes software support under such host controlled environments.

☐ Operating System

IBM S/360, S/370, 3030, 3081 & 4300 Processors

The 3270 operates under OS, DOS, OS/VS1, OS/VS2(SVS), OS/VS2(MVS, MVS/SE, MVS/SP), DOS/VS, DOS/VSE, and VM/370(VM, VME, VM/BSE, VM/SP) in conjunction with other systems software and programs.

TSO (Time Sharing Option) • provides for local/remote 3270 timeshared operation under all OS/DOS or communications/OS/DOS facilities.

TSO/E (Time Sharing Option/Extended) • incorporates all functions of TSO • complements full-screen System Productivity Facility (SPF) • operates in MVS/370 or MVS/XA environment.

IBM 8100 Processors

The 3270 operates under DPPX (Distributed Processing Programming Executive) general-purpose operating system, and DPCX (Distributed Processing Control Executive) multitask interactive operating system.

IBM S/3 Processors

The 3270 operates under 570-SC (Systems Control) series software in conjunction with other program facilities.

☐ Data Management

IBM S/360, S/370, 3030, 3081 & 4300 Processors

ATMS-II (Advanced Text Management System II) • provides conversational text processing capabilities, allowing the terminal to enter, edit, store, format, proof, and present textual material.

ACP (Airline Control Program) • special-purpose standalone combination operating system and database management system for airlines • provides for real-time (under 3 seconds) transaction processing in inquiry/update mode with large centralized database.

CICS/VS (Customer Information Control System/VS) • general-purpose communications/database system that provides an interface between operating system, access methods, and applications programs • has facilities for file inquiry, browsing, order entry and distribution, data entry and collection, and message switching/broadcasting in local/remote environments • usually operates in conjunction with DL/1, but IMS version also available.

IMS & IMS/VS (Information Management System) • IMS is program product supported by OS/BTAM allowing user to define message formats and associated screen image formats, and for message transmission between terminal and application program without regard for device characteristics • IMS/VS communications/database program product supports user-written batch processing and teleprocessing tasks; provides database and communications management for multiple applications employing common database.

DL/1 • stripped-down compatible version of IMS/VS designed to run under DOS/VS or DOS/VSE in conjunction with CICS/VS.

©1985 Data Decisions

IBM 3270 Series
Information Display System

SQL/Data System • limited function relational database system designed to complement DL/1 under DOS/VSE; includes extract feature which enables users to copy portions of DL/1 into an SQL/DS table.

STAIRS/VS (Storage & Information Retreival System) • provides for terminal-oriented, multiuser storage/retrieval operations, and for batch processing under OS/VS; previous queries made under STAIRS/VS may be referred to or extended, and take the form of simple language statements to extended Boolean logic.

Personal Services/370 • allows preparation, storage, retrieval, and dissemination of messages and office correspondence both within a single DISOSS/370 environment and across multiple DISOSS/370 systems • used with Entry Assist RPQ#8K1147 available on 3274C model controllers • allows documents to be displayed on 3270 terminals with 80-column format; prints documents on 3270 and SCS printers (3268-2, 3286-2, 3287-2) under CICS/VS • works in conjunction with DISOSS/370 Version 3 Release 2, under MVS/SP or VSE and CICS/VS.

IBM 8100 Processors

DTMS (Data Base & Transaction Management) allows for database and transaction processing management.

☐ Communications/Networks

IBM S/360, S/370, 3030, 3081 & 4300 Processors

BTAM & BTAM-ES (Basic Telecommunications Access Method & BTAM Extended Support) • provides control for data transfer between processor storage and local/remote BSC 3270 terminals • provides application/problem program with macros assembled into routines, inline instructions and linkages, and control blocks and table defining lines, terminals, and other devices to be used • support tended to 3270 includes generation of channel programs, starting I/O operations, handling attentions and line interruptions, and performing error recovery, counting and posting • allows display to write data into display/printer buffer; to erase buffer and write data; to erase all unprotected fields in buffer; to read data from buffer or specified buffer location; and to read modified fields from buffer or specified buffer location • supports 1920-character buffers for local 3274 attachment under real-memory versions of OS and DOS; all buffer sizes accommodated for remote BSC 3274/3276 attachment • BTAM-ES extends support to DOS/VSE environments, and to 4300 series processors; all buffer sizes are accommodated.

TCAM & ACF/TCAM (Telecommunications Access Method & Advanced Communications Function TCAM) • supports 3270 in either local or BSC/SDLC remote environments for data transfer between processor storage and display terminals • TCAM macros construct control program that governs messages between local/remote terminals and applications programs • ACF/TCAM add facilities for multisystem networking as well as expanding TCAM functions • TCAM macros define equipment configuration at facility and buffers necessary for message processing; functional macros select TCAM modules that route and edit messages, and check for message errors • support tended to 3270 by TCAM control systems includes auto insert/delete of line control characters; assignment, use and release of buffers during program execution; incoming/outgoing message edit; message error handling; and message traffic statistics maintenance • allows device scheduling under control program on general or specific polling basis • online test capability allows diagnostic testing on one control unit while other units continue processing • TCAM macros only support 1920-character buffers; ACF/TCAM supports all 3270 buffer sizes, but will not support 3274 for local SNA attachment • TCAM operates under the various real memory OS versions and the various virtual memory OS/VS operating systems; ACF/TCAM functions only with OS/VS.

VTAM, ACF/VTAM & ACF/VTAME (Virtual Telecommunications Access Method, Advanced Communications Function VTAM & VCF/VTAM Entry) • supports 3270 in local or BSC/SDLC remote environments for data transfer between terminals and applications programs • VTAM operates with 3704/3705 communications controllers, eliminating considerations of communications lines and controllers in application program coding • services provided include access control between device and applications programs; data transfer between device and program; allowing programs to share lines, controllers and devices; and allowing network monitoring and alteration • ACF/VTAM extends support by allocating main storage for buffer pools according to message traffic loads and availability of storage facilities; accumulating and displaying data on network status and resources; allowing data flow through multicontroller network without recourse to host system; and providing program-to-program communications facilities • VTAM operates under OS/VS and DOS/VS, and supports 1920-character buffers; ACF/VTAM is supported by OS/VS, DOS/VS, and DOS/VSE, and accommodates all buffer sizes; ACF/VTAME works with DOS/VSE, and supports all buffer sizes and 4331 attachment.

6580 Displaywriter System 3270 Attached Workstation • allows Displaywriter to emulate 3278 display and 3287 printer • attaches to 3274 Control Unit or 3276 Control Unit Display System • Displaywriter attaches to 4321 and 4331 Processors and 4701 Finance Communications Controllers via integrated adapters supporting 3278-2 and 3287-1 and -2.

Video/VS • allows data entry from 3270 terminals while permitting concurrent use of computers for other applications • version available for DOS/VSE (5796-PYT) and OS/MVS (5796-PYX) under CICS • permits full use of color with 3279 terminals.

Remote Spooling Communications Subsystems (RSCS) • RSCS Networking Version 2 accepts spooled output from Graphical Data Display Manager (GDDM) Release 3 (or later releases) and prints it on a 3270 printer; terminal need not be attached to the terminal of the CMS user invoking GDDM • SNA printers must be via LU3 session, or an SNA-character string data stream when connected to LU1 session • requires VM/SP Release 4 for processor-dependent function; SNA support requires ACF/VTAM • requires 512K bytes of real storage in non-VTAM environment and 2M bytes in VTAM environment.

IBM 8100 Processors

DPPX/DPCX operating systems provide communications facilities to 8100-to-3270 operations on direct or data link loop attachments.

IBM S/3 Processors

3270 Display Control Feature of S/3 RPG II provide local/remote BSC communications facilities for up to 15 3270-type displays • program feature automatically linked into RPG II application program via SPECIAL file exit capability • features include RPG access to 3270 displays attached by Local Communications Adapter, Local Display Adapter, Integrated Communications Adapter, or BSC Adapter of S/3; auto buffering and queuing of terminal data; display formatting interface for 3270 RPG II coding; and line control.

☐ Applications Development Aids

IBM S/360, S/370, 3030 & 4300 Processors

VM/CMS (Conversational Monitor System) • CMS is a VM/370 component that provides general-purpose conversational facility for program development and problem solving in remote timesharing modes.

DMS/VS (Display Management System) • under CICS/VS; will simplify establishment of online use of DMS/VS forms upon which users define data files, display images, and batch utility operations required.

GIS/VS (Generalized Information System) • allows non-EDP professionals to maintain and access information from database systems.

SPF (Structured Program Facility) • provides program development aid for VS2/TSO users equipped with 3270 24/32/43-line EBCDIC terminals configured with 12-user function keys.

 ©1985 Data Decisions

IBM 3270 Series
Information Display System

ISPF (Interactive System Productivity Facility) Version 2 • provides a dialog manager for interactive applications, and supports interactive applications (dialogs) in different hosts • runs under MVS/TSO, VM/CMS.

ISPF/PDF MVS (Interactive System Productivity Facility/ Program Development Facility for MVS Version 2) • aids in development of applications, including dialogs • uses display terminals in an interactive environment • runs under MVS.

VSPC (Virtual Storage Personal Computing) • operating under OS/VS and DOS/VS allows remote terminal users to perform problem-solving and personal computing tasks, or develop programs.

VS/APL • supported under VM/370 3270 Data Analysis and APL/Text features.

SCRIPT • supported under VM/370 3270 Text feature.

3277 APL Graphics Support • provides APL functions for curve plotting, curve fitting, contour plotting, 3-dimensional geometry • runs on 3277 with Graphics Attachment (RPQ 7H0284).

GDQF (Graphical Display & Query Facility) • allows viewing of CADAM models and APT geometry (PUNCH) files • outputs to 3287/4250 printers.

GDDM & PGF (Graphical Data Display Manager & Presentation Graphics Feature) • allows display of graphic or alphanumeric-graphic formats • PGF via GDDM generates business charts in conjunction with user application program or interactively with the user with no application program requirements • GDDM and PGF operate under CICS/VS, TSO with ACF/TCAM or ACF/VTAM, or VM/370 CMS.

IBM 8100 Processors

DMS (Development Management System) • provides for interactive development of applications via data selection from a file, map definition (display formatting), and application definition operations.

DPS (Distributed Processing Services) • formats displays for applications programs.

■ HARDWARE

☐ Terms & Support

Terms • the 3270 is available for purchase, 30-day rental, or 2-year lease basis; 3274 controllers offered on **purchase-only basis** after April 24, 1982 • discounts offered on multiple purchases based on product category • Category A devices consist of 3274 Control Unit, 3276 Control Unit Display Station, and 3290 Information Panel; discounts range from 9 percent for 10 to 19 purchases, 15 percent for 20 to 29, 20 percent for 30 to 44, 25 percent for 45 to 69, 30 percent for 70 to 124, 35 percent for 125 to 174, and 40 percent for 175 or more; for 3274/3276, the 3290 discounts are 6 percent for 25 to 49 units, 9 percent for 50 to 74, 12 percent for 75 to 99, 15 percent for 100 to 224, 20 percent for 225 to 349, 25 percent for 350 to 499, and 30 percent for 500 or more • Category B devices are the 3178/3180/3278 Display Station and 3179/3279 Color Display Station; discounts are 9 percent for 50 to 99 units, 15 percent for 100 to 249, 20 percent for 250 to 499, 25 percent for 500 to 999, 30 percent for 1,000 to 1,999, 35 percent for 2,000 to 2,999, and 40 percent for 3,000 or more • Category D devices are 3287, 3268, 3289 printers; discounts are 9 percent for 10 to 24 units, 15 percent for 25 to 64, 20 percent for 65 to 124, 25 percent for 125 to 249, 30 percent for 250 to 499, 35 percent for 500 to 749, and 40 percent for 750 or more • Category F is the 3299 Terminal Multiplexer; discounts are 9 percent for 15 to 29 devices, 15 percent for 30 to 59, 20 percent for 60 to 99, 25 percent for 100 to 174, 30 percent for 175 to 349, 35 percent for 350 to 499, and 40 percent for 500 or more • price protection plan guarantees no more than a 7-percent increase during second year • lease-purchase plan offered; purchase price will not be less than 45 percent of purchase price used to determine the net purchase option price under the agreement for lease or rental.

Support • IBM markets and supports the 3270 through a nationwide network of local offices • maintenance is bundled into rental or lease charges, and priced separately for purchased systems • basic monthly maintenance charge stated in following text provides for service availability on a Monday through Friday, 7:00 AM to 6:00 PM, 9 consecutive-hour basis; various extensions to such service for weekends and before/after standard hours are quoted at percentage premiums over the basic rate; full 7-day, 24-hour service adds a 47 percent premium to basic rate • certain modules of the 3270 have been designated as Customer Setup Units (CSU); these include 3274, 41C, 51C, and 61C; 3276 Control Unit Display Station; 3178/3180/3278 Display Stations; 3179/3279 Color Display Stations; 3290 Information Panel; 3299 Terminal Multiplexer; 3287, 3289, and 5210 Printers; once unpacked and in position, such CSUs can be setup and checked out by customer personnel, minimizing time required for going online with unit; remaining 3270 components are installed by IBM personnel • partially bundled; basic training is included in pricing with more extensive instruction at extra cost • the IIS program package also provides interactive online training for IMS/CICS/TCAM facilities • customer carry-in repair, carrier-in exchange, on-site exchange, and IBM on-site exchange maintenance programs offered for certain products; annual maintenance charge • time-and-material maintenance also offered • Display Station service offered in 5 different plans: IBM On-Site Exchange (#9830), Customer On-Site Exchange (#9824), Customer Carry-In Exchange (#9816), Customer Carry-In/ Repair (#9821), and Time-and-Material Repair • IBM On-Site Exchange calls for an IBM representative to bring replacement product to customer site and install and test it • Customer On-Site Exchange calls for IBM to deliver product but customer installs and tests it • Customer Carry-In Exchange calls for the customer to deliver the failing product to an IBM service/exchange center and pick up replacement product • Customer Carry-In/Repair calls for the customer to deliver the failing product to an IBM service/exchange center for repair; IBM ships the product prepaid to the customer site • Time and Material calls for IBM to repair product at an IBM repair center.

☐ Controllers

The IBM 3270 controllers consist of a family of locally attached (to the host processor) and remotely connected units with from 8 to 32 colocated workstations/printers in any combination. The only restriction is that at least 1 workstation must be included in each configuration.

The current controller lineup consists of the 3274 and 3276. The original 3270 controllers, consisting of the **3271/3272/3275**, are **no longer marketed**. The 3274 controllers are intended for local attachment and consist of Models 21A, 21B, 21D, 31A, 31D, 41A, and 41D. The remote units consist of the "C" Models and include the 21C, 31C, 41C, 51C, and 61C. The 3276 is a remote **or** local unit.

An examination of the specifications for 21, 31, and 41 models reveals substantial similarity and overlap. For example, the 21 series all have 64K bytes of RAM and accommodate 8 to 32 A/B category workstation/printers. The 31 series are very much the same as the 21, but have 128K bytes of RAM. The 41 series are greatly different. All have 192K bytes of RAM and support up to 32 workstation/printers, but category B devices are excluded. The protocols supported by the family are similar. Models 21A and 31A operate in SNA mode with extended datastream handling capabilities. Models 21D and 31D support 3272-like operations with extended data stream handling while Model 21B provides 3272-like operation only. Model 41A provides SNA operation with extended data stream handling, while 41D provides 3272-like operation with extended data stream handling. All models of the 3274, except the 41 series, contain 8 channels and are expandable to 32; the 41 includes 32 channels.

With the similarity among the products, it's obvious that IBM intends to replace the older 21 and 31 series with the newer 41 models. Unfortunately, IBM offers no upgrades to convert the 21 and 31 to 41 models.

Communication protocols supported by Models 21C, 31C, 41C, 51C, and 61C are the same. All support SDLC when communicating with the S/370 or 4300, and BSC when communicating with S/360. The 51C and 61C communicate with the 8100 Information System using SDLC. IBM also supports

 ©1985 Data Decisions

IBM 3270 Series
Information Display System

Models 31C, 41C, 51C, and 61C on X.25 PDNs. Again, given the overall similarities of these products, we expect the 21C, 31C, and 51C to be discontinued in the near future.

The 3276 is a control-unit display station combination that accommodates up to 8 slaved workstations/printers. The 3276 is composed of 8 separate models which differ primarily in the size of the display buffer and protocols supported. Models 1, 2, 3, and 4 offer 960/1920/2560/3440-character buffers, respectively, and support BSC (SDLC is optional). Models 11, 12, 13, and 14 offer identical buffers to the corresponding Models 1, 2, 3, and 4, but support only SDLC. In addition, Models 11 to 14 can operate over the switched public telephone network at speeds up to 4800 bps. IBM provides upgrades across the product line.

Users planning to contract for 3274 controllers based on lease/rental basis should note that all machines shipped after **August 24, 1984** will be available on a **purchase basis only**. In addition, effective **April 24, 1984**, orders will be accepted for **purchase only**. For those reasons, we have deleted rental prices on 3274 controllers.

While IBM does not offer an asynchronous terminal-handling facility as part of its 3270 line, it does offer a protocol converter that emulates the 3274D controllers. Called the Model 7171, it attaches to a local 43XX or 308X block multiplexer channel and interfaces up to 64 ASCII devices. These devices can be connected directly or remotely via switched or dedicated lines. Autobaud detection is also provided.

The user can define terminal types to the control unit through a terminal control table. Control tables are provided for the IBM 3101 Display Terminal, Datamedia 1520/1521/3045, Digital VT100, Lear Siegler ADM3A/ADM31, and Televideo 912/920/950 terminals. The 7171 also supports the IBM PC, System 9000, and other microcomputers running in a mode that emulates a supported ASCII device such as the IBM 3101.

The 7171 also provides 328X printer emulation for ASCII printers. A transparency option allows printers, plotters, and graphic devices to be attached and operate as native ASCII devices. An operator control option allows a password-protected terminal to access terminal status information and display it for diagnostic purposes.

Purchase price and monthly minimum maintenance charge (MMC) are $12,420/$229 for the basic 7171 Model 1 ASCII device attachment unit for 16 full-duplex devices; $830/$13 for an 8-line increment; $1,325/$13 for an 8-line addition; and $5,705/NA for a spare parts kit.

3274 Control Units

3274 Control Unit Models 21A, 21B, 21C, 21D, 31A, 31C, 31D, 41A, 41C & 41D • floorstanding control unit supporting up to 32 Category A terminal clusters (except 3290 which is limited to 31); 16 Category B terminal clusters supported by 21A, 21B, 21C, 21D, 31A, 31C, and 31D • Type A adapters attach to Category A terminals; Type B adapters attach to Category B terminals on all control units except 21C and 31C • local and remote attach cluster controllers • Category A terminals consist of 3178 Models C1 and C2 display stations; 3180 Model 1 display stations; 3262, 3268, 3287, 3289, and 5210 printers; 3278 Models 2, 3, and 4 displays, 3278 Model 5 (Model 21B excluded); 3279 Models S2A, S2B, S3G, 2X, 3X, 2A, 2B, 3A, and 3B (base color models only on 21A, 21B, 21C, 21D, 31A, 31C, and 31D); 3179 Model 1 color display station (same as 3279 Models S2A and S2B); 3290 information panel (except 21A, 21B, 21C, and 21D); 4250 Model 1 printer; 5210 Models G1 and G2 printwheel printers • 24 Type A connectors standard on 21A, 21B, 21C, 21D, 31A, 31C, and 31D; 32 Type A connectors standard on 41A, 41C, and 41D • Category B terminal is the 3277 Model 2 • diskette program loading facilities on 3274 allows user to configure initial display system and then change hardware/functions to meet new needs as required • Model 21 series can be upgraded directly to 31 series; Model 41A can be upgraded to 41D and vice versa • Model 21 equipped with 64K-byte controller; Model 31 equipped with 128K-byte controller; Model 41 equipped with 192K-byte controller • basic models support up to 8 Category A terminals • Models 41A, 41C, and 41D support up to 32 Category A terminals.

Local host processor attachment is via processor channels • 3274 Models 21, 31A/B/D, and 41A/D controllers attach in SNA-mode S/360 Models 30, 40, 50, 65, 75, and 195 and to S/370 Models 115 to 165 MP, as well as to 3030 processors via byte multiplexer, selector, or block multiplexer channels; however, attachment to non-DCC (Disconnect Chain Command) block multiplexer subchannel or to selector channel is not recommended because of reduced throughput considerations; 3274 Models 21A, 31A/B/D, and 41A/D attach to S/370, 3080, and 3081 via selector, byte, or block multiplexer channels; attachment to 4300 via byte or block multiplexers • 3274 Models 21/31B controller attaches in non-SNA 3272-mode to same processors and channels as 3274 Models 21/31A • 3274 Models 21/31/41D attach in non-SNA 3272-mode to virtual storage versions of same processors and via same channels as Models 21/31A • remote host attachment via leased/dial-up facilities • Models 21C, 31C, and 41C attach to S/370 or 4300 processors via 2701, 2703, 3704, 3705, or 3725 or via communications adapter feature on 4321 or 4331; attaches to S/360 Models 115, 125, 135, and 138 via Integrated Communications Adapter (ICA); attaches to S/360 Models 30, 40, 50, 65, 75, and 195 via 2701, 2703, 3704, or 3705 • ASCII/EBCDIC transmission code; all attached terminals require same character set • at least 1 display terminal required with each controller.

	$874/$696 mo	$14,200 prch	$72.00 maint
3274 Model 21A • local SNA mode:			
3274 Model 21B • local mode:	874/696	14,200	72.00
3274 Model 21C • remote BSC/SDLC:	613/488	9,990	55.50
3274 Model 21D • local mode for virtual storage:	874/696	14,220	79.50
3274 Model 31A • local SNA mode:	1,026/816	16,650	90.00
3274 Model 31C • remote BSC/SDLC:	764/608	12,420	73.50
3274 Model 31D • local mode for virtual storage:	1,026/816	16,650	97.50
3274 Model 41A • local SNA mode:	1,083/862	18,230	58.00
3274 Model 41C • remote BSC/SDLC:	820/653	13,840	40.00
3274 Model 41D • local mode for virtual storage:	1,083/862	18,230	58.00

3274 Model 21, 31 & 41 Series Control Field Upgrades • field-installable model upgrader/changer.

3274 Upgrade • Model 21A to 21B: $1,225.
3274 Upgrade • Model 21A to 21D: $1,130.
3274 Upgrade • Model 21A to 31A: $2,430.
3274 Upgrade • Model 21A to 31D: $3,445.
3274 Upgrade • Model 21B to 21A: $776.
3274 Upgrade • Model 21B to 21D: $655.
3274 Upgrade • Model 21B to 31A: $3,130.
3274 Upgrade • Model 21B to 31D: $3,020.
3274 Upgrade • Model 21C to 31C: $2,430.

MO: monthly charge for monthly rental (first figure) and 2-year lease (second figure), including maintenance. PRCH: purchase price. MAINT: monthly maintenance charge for prime-shift maintenance. NA: not applicable/available. NC: no charge. RPQ: request price quotation. All prices are for single units and are not discounted. Prices current as of May 1985.

 ©**1985 Data Decisions**

IBM 3270 Series
Information Display System

3274 Upgrade • Model 21D to 21A: $776.

3274 Upgrade • Model 21D to 21B: $748.

3274 Upgrade • Model 21D to 31A: $3,130.

3274 Upgrade • Model 21D to 31D: $2,430.

3274 Upgrade • Model 31A to 31D: $1,130.

3274 Upgrade • Model 31D to 31A: $776.

3274 Upgrade • Model 41A to 41D: $1,015.

3274 Upgrade • Model 41D to 41A: $695.

3274 Model 1, 21 & 31 Series • some terminal configurations and/or features and functions exceed the basic control storage capacity of 3274 controller configuration; IBM provides detailed tables equating memory requirements versus terminal types/categories and features/functions offered • requires 1 or more increments of Type C & D Extended Function Store (EFS) memory (features 3622, 3623, 3625, 3627, and 3628), and/or Type A terminal adapters (features 6901, 6902, and 6903).

6901 Type A1 Adapter • terminals 9 to 16:

52/42	918	2.00

6902 Type A2 Adapter • terminals 17 to 24:

52/42	918	2.00

6903 Type A3 Adapter • terminals 25 to 32:

52/42	918	2.00

7802 Type B1 Adapter • terminals 1 to 4:

60/48	986	4.00

7803 Type B2 Adapter • terminals 5 to 8:

52/42	831	2.50

7804 Type B3 Adapter • terminals 9 to 12:

52/42	831	2.50

7805 Type B4 Adapter • terminals 13 to 16:

52/42	831	2.50

3101 Integrated Diskette Drive Enhancement • installs enhanced file required to use configuration support D:

100/75	1,620	14.00

3274 Control Unit—Models 51C & 61C • tabletop control unit supporting up to 12 Category A and up to 4 Category B terminals on the 51C; the 61C supports 16 Category A terminals • 51C is shipped with 8- Category A terminal capacity; 61C is shipped with 16-terminal capacity • 51C has 64K bytes of control storage; 61C has 192K bytes.

Remote host processor attachment is via communication facilities to channel-connected transmission control units/adapters • 3274 Model 51C controller communicates in BSC with S/360 Models 30, 40, 50, 65, 75, and 195, S/370 Models 115 to 195, 3030, 3081, and 4300 processors via (where applicable) 2701 Data Adapter Unit, 2703 Transmission Control, or 3704/3705/3725 Communications Controller; with S/370 Models 115, 125, 135, and 138 processors via Integrated Communications Adapter; and with 4331 processors via Communications Adapter • 3274 Model 51C controller communicates in SNA/SDLC with S/370 Models 115 to 168, 3030, 3081, and 4300 processors via 3704/3705/3725, or with 4321 or 4331 processor via Communications Adapter; and with 8100 processors via data-link, or direct attach or data-link attach loop (cannot support Category B terminal adapters) • the 61C controller communicates with S/370 or 4300 using SDLC via a 3704/3705, 3725, or communications adapter on 4321 or 4331; BSC communication and attachment same as 51C • both controllers operate at line speeds of 1200 to 9600 bps in half-duplex mode over full-duplex facilities; also operate in half-duplex mode at 9600/38.4K bps over direct attach loop or 2400/4800/9600 bps over data-link attached loop on 8100 • ASCII/EBCDIC transmission code; all terminals require same character set.

Direct local connection without communication facilities or modem is possible for 3274 Model 51C and 61C to 3704/3705/3725 Communications Controller or 4321 and 4331 Communications Adapter attachment • communication with 4331 also provided via direct- or data-link attached loop for 51C and 61C • operation is at 1200 bps in BSC or SDLC.

3274 Model 51C • remote BSC/SDLC 8-Category A terminal support:

282/225	4,885	37.50

3274 Model 61C • remote BSC/SDLC 16-Category A terminal support • 192K bytes of control storage:

434/345	7,600	27.00

5101 Integrated Diskette Drive Enhancement • installs enhanced file required for configuration support D:

87/74	1,530	13.00

5550 Power Expansion Unit • required for supplying additional power for terminals attached via Type B adapters:

16/14	341	1.50

7801 Type B Adapter • terminals 9 to 12 on 51C:

56/48	986	4.00

3276 Control Unit Display Stations

Tabletop control unit with integral display terminal supporting up to 8-terminal clusters for remote processor attachment • 3276 Model 1 display-controller with 960-character buffer supports 3278 Model 1 displays, 3287 Models 1, 1C, 2, and 2C printers, 3289 Models 1 and 2 line printers and 3262 Model 13 line printers • 3276 Model 2 display-controller with 1920-character buffer supports 3178, 3180 Model 1, 3278 Models 1 and 2 displays, 3179, 3279 Models 2A and 2B color displays, 3268 Model 2 printer, 5210 Models G1 and G2 printers, 3287 Models 1, 1C, 2, and 2C printers, 3289 Models 1 and 2 line printers and 3262 Model 13 line printers • 3276 Model 2 display controller support for S/3 applications only; accommodates 3180 Model 1, 3278 Model 2, 3287 Model 2 displays, 3287 Models 1 and 2 printers, 3268 Model 2 printers, and 3289 Models 1 and 2 line printers • 3276 Model 3 display-controller with 2560-character buffer supports 3180 Model 1, 3278 Models 1, 2, and 3 displays, 3279 Models 2A, 2B, 3A, and 3B color displays, 3287 Models 1, 1C, 2, and 2C printers, 3289 Models 1 and 2 line printers, and 3262 Model 13 line printers • 3276 Models 4, 11, 12, 13, and 14 display controllers support 3180 Model 1, 3278 Models 1, 2, 3, and 4 displays, 3279 Models 2A, 2B, 3A, and 3B color displays, 3287 Models 1, 1C, 2, and 2C printers, 3268 Model 2 printer, 3289 Models 1 and 2 line printers, 3262 Model 13 line printers, 5210 Models G1 and G2 printers • basic display-controller configuration supports integral display and has port for 1 additional terminal • see Terminals section for display-oriented features.

Remote host processor attachment is via communication facilities to channel-connected transmission control units/adapters • 3276 Models 1, 2, 3, and 4 display controllers communicate in BSC with S/360, S/370, or 4300 processors via 2701 Data Adapter Unit, 2703 Transmission Control, or 3704/3705/3725 Communications Controller; with S/370 Models 115, 125, 135, or 138 via Integrated Communications Adapter; or with 4331 via Communications Adapter feature • 3276 Models 11, 12, 13, and 14, or Models 1, 2, 3, and 4 with BSC/SDLC switch display controllers communicate in SDLC with S/370 or 4300 processors via 3704/3705/3725, or with 4331 via Communications Adapter feature • 3276 Models 11, 12, 13, and 14 communicate in SDLC with 8100 processors via data-link, or direct or data-link attached loop; 3276 Models 1, 2, 3, and 4 with BSC/SDLC switch communicate in SDLC with 8100 processors via data link • 3276 Models 12, 13, and 14, or Models 2, 3, and 4 with BSC/SDLC switch communicate in SDLC with 3790 Communication System via SDLC data link in 1920-character modes • 3276 Model 2 display controller communicates in BSC with S/3 Models 4, 10, and 15 via BSC adapter, Models 8 and 12 via BSC or Integrated Communications adapters, and with Model 15D via BSC adapter or controller • 3276 operates in half-duplex mode over half-/full-duplex facilities at 1200 to 7200 bps using BSC, and 1200 to 9600 bps using SDLC • transmission code is EBCDIC or ASCII; however, all attached terminals must employ same character set.

Direct local connection without communication facilities or

 ©1985 Data Decisions

IBM 3270 Series
Information Display System

modem is possible for 3276 to 3704/3705/3725 Communications Controller on S/370, 3030, 3081, or 4300 processors, or 4331 Communications Adapter attachment • operation is at 1200 bps using BSC or SDLC protocol.

3276 Model 1 • remote BSC with 960-character display buffer (not in new production).

3276 Model 2 • remote BSC with 1920-character display buffer (not in new production).

3276 Model 3 • remote BSC with 2560-character display buffer:

$306/$243 mo	$5,680 prch	$36.00 maint

3276 Model 4 • remote BSC with 3440-character display buffer:

318/254	5,830	36.50

3276 Model 11 • remote SDLC with 960-character display buffer (not in new production).

3276 Model 12 • remote SDLC with 1920-character display buffer:

301/240	5,535	31.00

3276 Model 13 • remote SDLC with 2560-character display buffer:

306/243	5,680	31.50

3276 Model 14 • remote SDLC with 3440-character display buffer:

318/238	5,830	32.00

3276 Control Unit Display Station Upgrades • field-installable model upgrades for 3276 display controllers are available on purchase-only basis with no additional installation charges.

3276 Upgrade • Model 1 to 2: $1,005.

3276 Upgrade • Model 1 to 3: $1,035.

3276 Upgrade • Model 1 to 4, 2 to 4, 3 to 4: $1,060.

3276 Upgrade • Model 1 to 11, 2 to 12, 3 to 13, 4 to 14: $823.

3276 Upgrade • Model 1 to 12, 2 to 13, 3 to 14: $1,305.

3276 Upgrade • Model 1 to 13, 2 to 14: $1,360.

3276 Upgrade • Model 1 to 14: $1,420.

3276 Upgrade • Model 11 to 12: $569.

3276 Upgrade • Model 11 to 13, 12 to 13: $605.

3276 Upgrade • Model 11 to 14, 12 to 14, 13 to 14: $660.

1067 APL/Text Control • provides for APL/Text or Text Print for terminals attached to 3276; field-installable option requires Extended Function Base (feature 1068) and APL/Text (feature 1120):

47/38	950	1.00

1068 Extended Function Base • provides for addition of APL/Text Control (feature 1067), and for attachment of 3279 color displays to 3276:

6/5	190	1.00

1950 Color Display Attachment • allows attachment of 3179 and 3279 color displays; field-installable option requires Extended Function Base (feature 1068) and APL/Text Control (feature 1067); cannot be employed with SDLC/BSC switch:

40/32	758	0.50

Terminal Adapters • provide for attachment of 3270-type terminals to 3276 display controller.

3255 Adapter No 1 • for terminals 2 and 3:

23/19	530	1.50

3256 Adapter No 2 • for terminals 4 and 5:

23/19	589	1.50

3257 Adapter No 3 • for terminals 7 and 8:

23/19	530	1.50

☐ I/O Channels

3270-To-Processor Local Attachment

Local host-processor attachment is via selector, byte multiplexer, or block multiplexer channel on the S/370 models and via byte multiplexer or block multiplexer channels on 3030, 3081, and 4341 processors, with 3270 control unit attached to 1 of 8 positions on channel interface (note that IBM does not recommend non-DDC subchannel attachment to block multiplexer channel or to selector channel because of less than maximum throughput considerations) • the 3270 can locally attach to a display adapter or the byte multiplexer on the 4331 • channel provides 3270 control unit with display/print data, and with control instructions needed to operate attached terminal devices • terminal buffers store data forwarded via control unit for display/print or modification • local-attached 3270 control units may be positioned no more than 200 feet from processor channel • all 3274 Models control units except the "C" models are used for local attachment (see 3270 Controllers section for other particulars).

Local-type attachment via direct connection to 8100 data loop, or via S/3 communications channels is also employed for certain 3270 configurations employing remote-type control units or standalone displays. (See 3270 Communications section for other particulars.)

Remote host processor attachment is via communication facilities to channel-connected transmission control units/adapters; however, certain remote 3270 control units can communicate via communication controllers or adapters without recourse to modem or communication facilities in a direct-connect mode (see 3270 Controllers and Communications sections for other particulars).

3270-To-Terminal Device Attachment

The 3274 attaches Category B terminals via direct cable connection at distances up to 2,000 feet from terminal adapter • 3276 controllers also attach terminals at distances up to 2,000 feet; 3274 Category A terminals can be located up to 4,900 feet from controller • 3287 Models 1 and 2 printers can be positioned up to 2,000 feet from controller; 3287 Models 1C and 2C and 3289 printers allow distances up to 4,900 feet (see Controllers section for other details) • terminals connected to 3299 terminal multiplexer can be located up to 4,920 feet from the mux; the 3299 can be located up to 4,920 feet from the 3274 controller (see Terminal Multiplexer for details).

☐ Communications

The 3270 display system communicates with a remote processor via half-duplex data transmission on a single point-to-point, half-/full-duplex or multipoint full-duplex facility in BSC and/or SDLC protocol • dedicated (leased) private line facilities can be employed with any 3270 control unit • switched (dial) public telephone facilities can also be employed with 3274-51C and 61C, and 3276-11, 12, 13, and 14 models • IBM or independent vendor-supplied modems can be employed. 3274-31C, -41C, -51C, and -61C available in customized versions permitting interface to X.25 networks.

All remote 3270 models communicate with S/360, S/370 (including 3030 and 3081), or 4300 processors by transmitting to a channel-attached 2701, 2703, 3704, 3705, or 3725 communication or front end; they can also transmit to integrated adapters on the S/370 Models 115, 125, 135, and 138 or on the 4331 (1601 ICA). Specific hosts are detailed in discussions describing each model (see 3270 Controllers section for other particulars); only 1 remote host processor may be attached to a 3270. 3270-type display, printer and line printer terminals cannot remotely attach to 3270 control units via transmission line facilities (see 3270 Controllers and I/O Channels sections for other particulars on terminal attachment).

3274 Control Unit Communications

Models 21C, 31C, and 41C communicate in BSC or SDLC protocol over dedicated lines at 2000/2400/4800/7200/9600-bps rates • Models 51C and 61C communicate in BSC or SDLC

 ©1985 Data Decisions

IBM 3270 Series
Information Display System

on dedicated lines at 1200/2000/2400/4800/7200/9600-bps rates, and on switched lines at 1200/2000/2400/4800 bps • remaining 3274 controller models local attach only (see 3270 Controllers section for other particulars).

Adapters & Interfaces • various communication adapters or interfaces are employed for data transmission applications on 3274 Model "C" controllers • 3701 External Modem Interface provides EIA cable and interface logic for attachment of IBM or equivalent modems • Digital Data Service (DDS) adapters support BSC/SDLC transmission at 2400/4800/9600 bps over AT&T Dataphone Data Service (DDS) facilities; 5650 DDS adapter supports point-to-point communication, and 5651 DDS supports multipoint communication • 1 Common Communications Adapter is required on 3274 Model 51C and 61C to handle BSC/SDLC transmission control protocols, and to support other communication adapters or interfaces; 6302 Common Communications Adapter supports communication of up to 9600 bps through IBM or equivalent modems that provide clocking, or through DDS adapters • CCITT V.35 interface adapter provides clocking up to 56K bps; BSC not supported at speeds above 9600 bps • offered with Models 21C, 31C, 41C, 51C, and 61C • X.21 adapter for SDLC data transmission at speeds of 2400/4800/9600 or 48K bps on dedicated facilities; offered with Models 21C, 31C, 41C, 51C, and 61C • **X.25 support** function selectable during customization of Models 31C, 41C, 51C, and 61C; allows attachment to X.25 PDN at speeds to 9600 bps.

1550 CCITT V.35 Interface:

$22/$18 mo	$525 prch	$1.50 maint

3701 External Modem Interface • for EIA cabling and logic (included with Models 21C, 31C, and 41C):

16/14	337	3.00

5650 DDS • point-to-point adapter:

36/29	840	1.50

5651 DDS • multipoint adapter:

36/29	840	1.50

5655 X.21 Adapter • nonswitched networks:

33/27	800	1.50

5656 X.21 Adapter • switched networks:

41/33	800	2.00

X.25 Interface Support • customized function for 3274 Models 31C, 41C, 51C, and 61C • requires Configuration Support D Release 62, 256K bytes of control storage (features 3660), and one of the following interfaces: 3701, 5655, or 1550:

NA/NA	NA	NA

6302 Common Communications • BSC/SDLC 9600-bps adapter (included with Models 21C, 31C, and 41C):

14/12	365	2.00

6303 High Performance Communications Adapter • required on 41C and 61C for attaching to communications facilities at speeds up to 9600 bps; BSC/SDLC operation:

58/46	1,010	8.50

4850 Loop Adapter • for 8100 system operations:

42/34	797	3.00

3680 Encrypt/Decrypt Communications Security • provides Federal Data Encryption Standard 56-bit key variable algorithm capability for 3274 21C, 31C, 41C, 51C, and 61C transmission over unprotected lines to processors employing ACF/VTAM Encrypt/Decrypt Program 5735-RC2 and Programmed Cryptographic Facility Program Product 5740-XY5:

85/68	1,780	2.00

6101 Response Time Monitor • measures and records transaction time between an inbound host attention (AID) and user-defined transaction end:

NA/NA	595	NA

Particulars on external IBM modems that may be employed with 3274 controllers are discussed at the end of this section.

3276 Control Unit Display Station Communications

Models 1, 2, 3, and 4 communicate in BSC over dedicated lines at 1200/2000/2400/4800/7200 bps; with 6315 SDLC/BSC switch installed, the Models 1, 2, 3, and 4 can also communicate over dedicated lines in SDLC at 1200/2000/2400/4800/7200/9600 bps • Models 11, 12, 13, and 14 communicate in SDLC over dedicated lines at 1200/2000/2400/4800/7200/9600 bps, and on switched public lines at 1200/2000/2400/4800 bps • 3276 must be equipped with Common Communications feature, and either External Modem Interface, DDS Adapter or Integrated Modem for remote communication interfacing • 4850 Loop Adapter is employed for data link or direct attachment to 8100.

3701 External Modem Interface • for EIA cabling and logic:

$16/$14 mo	$337 prch	$3.00 maint

5650 DDS • point-to-point adapter:

36/29	840	1.50

5651 DDS • multipoint adapter:

36/29	840	1.50

5655 X.21 Adapter/Dedicated Networks • provides interface and cable for attaching Models 11, 12, 13, and 14 to X.21 dedicated DCE • SDLC at 2400/4800/9600 bps:

32/26	800	1.50

5656 X.21 Adapter/Switched Networks • provides interface and cable for attaching Models 11, 12, 13, and 14 to switched networks at speeds of 2400/4800/9600 bps:

40/33	884	2.00

6301 Common Communications • 1200-bps adapter:

24/20	489	2.50

6302 Common Communications • BSC/SDLC 9600-bps adapter:

23/11	543	2.50

6315 SDLC/BSC Switch • for Models 1, 2, 3, and 4; mutually exclusive with 1068 Extended Function Base:

32/26	682	3.00

5500 1200-bps Integrated Modem • dedicated:

29/24	535	5.50

5501 1200-bps Integrated Modem • switched; auto-answer:

39/32	714	2.50

5502 1200-bps Integrated Modem • switched; manual answer:

29/24	535	3.00

5507 1200-bps Integrated Modem • dedicated; manual-answer dial backup:

43/35	766	5.50

5508 1200-bps Integrated Modem • dedicated with auto-answer dial backup:

47/38	855	3.00

4850 Loop Adapter • for 8100 system operations with Models 11, 12, 13, and 14:

42/34	797	3.00

3680 Encrypt/Decrypt Communications Security • provides Federal Data Encryption Standard 56-bit key variable algorithm capability for 3276 Models 11, 12, 13, and 14 transmissions over unprotected lines to processors employing ACF/VTAM Encrypt/Decrypt Program 5735-RC2 and Programmed Cryptographic Facility Program Product 5740-XY5:

85/68	1,600	2.00

External Modems

External IBM or equivalent modem can be employed for 3270-to-processor remote communication over transmission facilities • external modem attaches to 3270 via 3701 External Modem Interface and 6301 clocked 1200-bps or 6302/6303 nonclocked 9600-bps Common Communications Adapter on 3274 and 3276 control units.

3701 External Modem Interface • for EIA cabling and logic:

$16/$14 mo	$337 prch	$3.00 maint

©1985 Data Decisions

IBM 3270 Series
Information Display System

6301 Common Communications • 1200 bps clocked:

23/20	543	2.50

6302 Common Communications • 9600 bps nonclocked:

14/12	365	2.00

6303 Common Communications • 9600 bps nonclocked for Type B terminal adapter on 3274 Model 51C:

58/46	1,010	8.50

3863 Modem • 2400 bps with 1200-bps half-speed backup and automatic remote speed selection • Model 1 operates in half-/full-duplex mode over unconditioned 4-wire, dedicated full-duplex point-to-point or multipoint lines • Model 2 operates in half-duplex mode over 2-wire switched facilities • auto-answer is standard on Model 2 and available on Model 1 via 4-wire SNBU option • Model 1 can be equipped with Fan Out feature that allows modem attachment to up to 3 terminals or controllers (only 1 may transmit at a given time), and with 4-Wire Switched Network Backup (SNBU) feature for auto-answer dial backup.

3863 Model 1 • 2400-/1200-bps dedicated modem:

102/87	2,685	13.00

3863 Model 2 • 2400-/1200-bps switched modem:

110/94	2,935	15.50

3901 Fan Out • 3-terminal attachment for Model 1:

34/29	804	2.00

7953 SNBU • auto-answer dial backup for Model 1:

54/46	1,180	10.00

3863 Model 1 modem can be employed with any 3274 or 3276 remote controller • 3863 Model 2 may only be applied in primary switched line environments with 3274 Model 51C and 3276 Models 11, 12, 13, and 14 controllers.

3864 Modem • 4800 bps with 2400-bps half-speed backup and automatic remote speed selection • Model 1 operates in half-/full-duplex mode over unconditioned 4-wire, dedicated full-duplex point-to-point or multipoint lines • Model 2 operates in half-duplex mode over 2-wire switched facilities • auto-answer is standard on Model 2 and available on Model 1 via 4-wire SNBU option • Model 1 can be equipped with Fan Out feature that allows modem attachment to up to 3 terminals or controllers (only 1 can transmit at a given time), and with 4-wire Switched Network Backup (SNBU) feature for auto-answer switched backup capabilities.

3864 Model 1 • 4800-/2400-bps dedicated modem:

176/150	3,715	21.00

3864 Model 2 • 4800-/2400-bps switched modem:

188/160	3,925	22.00

3901 Fan Out • 3-terminal attachment for Model 1:

34/29	804	2.00

7953 SNBU • auto-answer dial backup for Model 1:

54/46	1,180	10.00

3864 Model 1 modem can be employed with any 3274 or 3276 remote controller • 3864 Model 2 can only be applied in primary switched line environments with 3274 Model 51C and 3276 Models 11, 12, 13, and 14 controllers.

3865 Modem • 9600 bps with 4800-bps half-speed backup and automatic remote speed selection • Model 1 operates in point-to-point mode and Model 2 in multipoint mode in half-/full-duplex over full-duplex unconditioned 4-wire dedicated lines • both models can be equipped with Fan Out for attachment to up to 3 terminals or controllers (only 1 may transmit at a given time), and with 4-wire Switched Network Backup (SNBU) for auto-answer switched backup capabilities • Model 1 may also be equipped with Data Multiplexer feature for subchannel operation at 9600, 4800/4800, 4800/2400/2400, or 2400/2400/2400/2400 bps at full-speed, or 4800 or 2400/2400 at half-speed operation.

3865 Model 1 • 9600-/4800-bps point-to-point modem:

282/240	5,885	30.50

3865 Model 2 • 9600-/4800-bps multipoint modem:

282/240	5,885	30.50

3901 Fan Out • 3-terminal attachment:

34/29	804	2.00

7953 SNBU • auto-answer dial backup:

54/46	1,180	10.00

3260 Data Multiplexer • subchannels for Model 1:

47/40	1,075	4.00

3865 modem may be employed with 3274 and 3276 remote controllers.

3868 Modem • rackmounted versions of the 3863, 3864, and 3865 modem family inserted in a 3866 multimodem enclosure • 9600/4800/2400-bps half- or full-duplex modems with half-speed backup and automatic remote-speed selection • Model 1 (equivalent to 3863-1) operates over a 4-wire dedicated facility in a point-to-point or multipoint arrangement at speeds of 2400/1200 bps • Model 2 (equivalent to 3864-1) operates over a 4-wire dedicated facility in a point-to-point or multipoint arrangement at speeds of 4800/2400 bps • Model 3 (equivalent to 3865-1) operates over a 4-wire dedicated facility in a **point-to-point** arrangement only at speeds of 9600/4800 bps • Model 4 (equivalent to 3865-2) is identical to Model 3, except operates in multipoint arrangement.

3868 Model 1 • 2400-/1200-bps point-to-point or multipoint modem:

102/NA	2,550	12.00

3868 Model 2 • 4800-/2400-bps point-to-point or multipoint modem:

165/NA	3,340	12.50

3868 Model 3 • 9600-/4800-bps point-to-point modem:

263/NA	5,000	13.50

3868 Model 4 • 9800-/4800-bps multipoint modem:

263/NA	5,000	13.50

3872 Modem • 2400 bps with 1200-bps half-speed backup for operation in half-duplex mode over 2-/4-wire multipoint lines • point-to-point, multipoint tributary, switched network, switched network backup, 3-terminal Fan Out attachment, auto-call originate and alternate voice features are available as field-installable options • separate modem add-on sharing the same power supply and cabinet is also possible, but precludes Fan Out, auto-call, and dial backup.

3872 • 2400-/1200-bps multipoint modem:

153/NA	2,975	19.00

1051/1052 • first/second modem; alternate voice:

25/NA	525	0.50

1091 Auto-Call Originate • for auto-call terminals:

56/NA	1,050	7.50

3901 Fan Out • 3-terminal attachment:

36/NA	701	1.00

5101/5102 • first/second modem; multipoint tributary:

23/NA	490	3.00

6101/6102 • first/second modem; point-to-point:

9/NA	244	1.50

6302 • second modem:

134/NA	2,445	13.00

7941/7942 • first/second modem; switched network:

25/NA	525	7.00

7951 • switched network backup:

14/NA	349	3.00

7952 • switched network backup with auto-answer:

25/NA	525	3.00

3872 modem can be employed in dedicated mode with 3274 and

 ©1985 Data Decisions

IBM 3270 Series
Information Display System

3276 remote controllers and in primary switched line environments with 3274 Model 51C and 3276 Models 11, 12, 13, and 14 controllers.

Terminal Multiplexer

The 3299 Terminal Multiplexer connects Category A terminals to any 3274 Control Unit, except a 51C. The multiplexer reduces coaxial cable requirements by combining up to 8 terminals on a single coaxial cable connected to a 3274 Control Unit. Up to four 3299s can be attached to any controller except the 61C, which is limited to 2. The 3299 can be located up to 4,920 feet from 3274; each terminal can be located up to 4,920 feet from the multiplexer. Terminals connected in this fashion can be located up to 9,840 feet from the 3274 Control Unit.

3299 Terminal Multiplexer • time-division multiplexer (TDM) accommodates 8 Category A terminals and connects to 3274 controller:

NA/NA mo $1,175 prch NA maint

☐ Workstations/Terminals

IBM supports the 3270 with an extensive line of monocromatic and color terminals plus a gas plasma information panel. In addition, IBM offers personal computer attachment either via a standalone 3270 Personal Computer or a personal computer retrofitted to a 3278-2 workstation. Customers with Model 6580 Displaywriters can also attach these units to the 3274 controller (see Distributed Configurations).

The monocromatic products consist of Models 3178, 3180, 3277, 3278 workstations; Models 3179 and 3279 are color terminals. The 3290 Information Panel is a gas plasma terminal, somewhat of a misnomer since it does have a keyboard and allows host-processor interaction.

As with the controllers, there is a considerable duplication among the terminal lines. For example, the 3178, 3277, and 3278-2 duplicate each other in number of characters displayed and editing/formatting facilities. The 3180 Model 1 provides the base functions of the 3278 Models 2 through 5. In addition, the 3179 color terminal is functionally equivalent to the 3279 Models S2A and S2B. We expect the older models to be discontinued in the near future. The only exception might be the 3277. That product is one of the few Category B devices still available and needed to support the older 3271/3272/3274 controllers.

The 3179 and 3180 offer facilities not available on the products they replace. For example, the 3180 Model 1 has a 7680-character buffer which allows the operator to vertically scroll data. Both also support a keyboard definition utility whereby the internal keyboard tables can be modified to conform with modifications made to the keyboards to accommodate user-specific applications. Any combination of 4 standard and modified keyboard layouts can be defined in this manner for each 3274 control unit. For those planning to use these unique functions, IBM requires the 3274 to have Configuration Support D Release Level 63 Microcode. There is **no charge** for this upgrade.

The 3180 contains a number of unique features itself. For example, by invoking the **record/playback** function, a series of up to 96 keystrokes can be saved via the record key, and recalled and displayed on command. This saved data is retained when power is switched off. The 3180 also allows the operator to select **dual or monocase** characters from the keyboard, providing the capability to display uppercase alphanumeric characters only for 3277 compatibility. A notable feature of the 3180 Model 1 is the local print facility. With it the operator can initiate a local display-to-printer copy without host intervention when the terminal is attached to a 3274/3276 controller.

The 3180 Model 1 is unique to anything in the 3270 line in that it allows users to **select** the number of **displayable characters** and their formats. Essentially, Model 1 provides the base functions of the 3278-2 through 5 and undoubtedly replaces those terminals.

For its 3179 and 3180 terminals, IBM's maintenance plans include Customer Carry-In Repair, Customer Carry-In Exchange, Customer On-Site Exchange, and IBM On-Site Exchange. This report uses the IBM On-Site Exchange (see Terms & Support for details).

Display images on 3270 may be unformatted with no defined fields, or formatted with program-defined fields and field attributes. Formatted fields may be protected from operator modification, or may be unprotected and allow operator data input or modification via keyboard. 3270 field attribute capabilities include alphanumeric or numeric-only input; character display/nondisplay; blink, intensity, reverse video or underscore highlighting; color highlighting and display (3179 and 3279 only); selector light pen field detect/nondetect; tab to next unprotected field; and program-tab write to successive unprotected fields. 3270 functional controls include Write, Write Structured, Erase All (clear), Erase Unprotected (clear input), Read and Read Modified commands; host or operator-initiated Local Copy (print); and host-initiated Copy (data transfer) between terminals on same cluster.

The 3278 terminal can be field upgraded to connect an IBM 5150 personal computer via a personal computer adapter (feature 5315 or 5316). The upgraded terminal supports most DOS1.1-based personal computer programs, including APA (All Points Addressable) graphics; 16 levels of color intensity when used with the personal computer color graphics adapter; user-definable character sets; character attributes; and business graphics.

The personal computer (feature 8501206) attaches to a 3278 via a 5-foot cable; connections are made to the display adapter and cable distribution box; the keyboard attaches to the cable distribution box using existing keyboard cable. After installation, the 3278 operates in switch-selectable host compute and personal compute modes. In host compute mode, the 3278 operates as it did prior to the upgrade, except that data transfer is now supported if a 3274 controller is used. Data is transferred bidirectionally between the 3274 via 3278 to the program running in the personal computer. Data flow between the host and 3274 employs a new structured field type of 3270 data stream. Typical data transfers are screen capture and file transfer. Screen capture transfers data displayed on a 3278 screen to the personal computer's printer or diskette in ASCII code. File transfer requires both personal computer and host sample applications; VM/SP (CMS) or TSO controls the operation.

In personal computer mode, the image displayed on the 3278 screen is received from the personal computer adapter. Keystrokes are directed to the personal computer program. Users can write BASIC programs, run VisiCalc, or process any data in personal computer storage.

In addition to the personal computer attachment, IBM offers a standalone 3270 PC which can be used with 3274 controllers. The 3270 PC handles up to 4 concurrent sessions, and also emulates the IBM 3178, 3278 (except 2 or 5) or the 3279 (except Model 2C). For details, see report 950-I048-3271.

3178 Display Station

Configuration • cluster display employed with 3274/3276 control unit • modular (detached) typewriter-/data entry-style keyboards.

Display • 12-inch diagonal • 7x14 dot matrix • 1920-character, 24-line x 80-character format • 94 EBCDIC or ASCII character set • blink and nonblink underscore and block cursor.

Edit & Format Features • auto-repeat keyboard • 10 programmable function keys on data entry keyboard; 24 on typewriter-style keyboard • cursor up, down, left, right pad; home, new line, tab, backtab, backspace key functions • cursor address write • erase to EOF; clear input, clear • character insert and delete • protected and numeric-only fields • selector light pen field select • blink, intensity, reverse video, underscore, nondisplay attributes.

Communications • via controller—see 3270 Communications for details.

Peripherals • mag card slot reader or mag hand scanner • cluster printers via controller.

Model C10 • 1920-character display; 75-key, data entry keyboard:

NA/NA mo $1,660 prch $14.00 maint

©**1985 Data Decisions**

IBM 3270 Series
Information Display System

Model C20 • 1920-character display; 87-key, typewriter-style keyboard:

NA/NA	1,720	14.00

Model C3 • 1920-character display; 87-key typewriter keyboard with numeric keypad • cannot attach to 4321 processor:

NA/NA	1,720	14.00

Model C4 • 1920-character display; 87-key typewriter keyboard with 49 alphanumeric keys, 26 control keys, and a block 12 numeric key (0 to 9 plus decimal and tab) in lower and upper shifts, and program function keys 13 through 24 shiftable:

NA/NA	1,720	14.00

3179 Color Display Station

Configuration • cluster display employed with 3274/3276 control units • modular (detached) 87- or 122-key, typewriter-style keyboard standard; typewriter/APL, typewriter/text, data entry, and data entry keypunch keyboards optional.

Display • 14-inch diagonal tilt and swivel screen • 7x9 matrix • 1920-character 24-line x 80-character format, plus 25th status line • 96 EBCDIC or ASCII; 222 EBCDIC/APL • custom character sets • 7-color presentation (white, red, blue, green, pink, yellow, and turquoise) • blink and nonblink block and underscore cursor.

Edit & Format Features • auto-repeat keyboard • 10, 12, or 24 user-function keys • cursor up, down, left, right, home, new line, tab, backtab, backspace key functions • cursor address write • erase to EOF; clear input, clear • character insert and delete • protected and numeric-only fields • light pen field select • 7-color blink, intensity, reverse video, underscore, nondisplay attributes • vertical scrolling.

Communications • via controller—see 3270 Communications section for particulars.

Peripherals • cluster printers via controller.

Keyboards • 87- or 122-key, typewriter-type EBCDIC/ASCII • 24 program function keys • low profile, 6, 12, or 18 degrees of inclination • standard on 3179.

Model 1 • 7-color, 1920-character display station:

NA/NA mo	$2,295 prch	$11.25 maint

3180 Display Stations

Configuration • cluster display utilized with 3274 or 3276 control units • 75-key, data entry-style keyboard (Model 120); 87-key, typewriter-style keyboard with 81 specific APL characters and 24 program function keys (Model 130) • 7680-character screen buffer.

Display • 15-inch diagonal tilt and swivel • 7x9 matrix • 3564-character 27-line x 80-character format; 3440-character, 43-line x 80-character format; 2560-character, 32-line x 80-character format; 1920-character, 24-line x 80-character format • extra status indicator line • 96 EBCDIC or ASCII; 222 EBCDIC/APL; custom character sets • blink and non-blink underscore and block cursor.

Edit & Format Features • auto-repeat keyboard • 10, 12, or 24 user-function keys • cursor up, down, left, right pad; home, new line, tab, backtab, backspace, key functions • cursor address write • erase to EOF; clear input, clear • character insert and delete • protected and numeric-only fields • selector light pen field select • blink, intensity, reverse video, underscore, nondisplay attributes • vertical scrolling of 4 pages via 7680-character screen buffer.

Communications • via controller—see 3270 Communications section for particulars.

Peripherals • mag card slot reader or mag hand scanner • cluster printers via controller.

Keyboards • 75-key, data entry-style keyboard standard on Models 120; 87-key typewriter-style keyboard with 81 APL characters and 24 program function keys standard on Model 130.

3180-120 • 3564/3440/2560/1920-character display formats • data entry-style keyboard:

NA/NA mo	$2,295 prch	$12.33 maint

3180-130 • 3564/3440/2560/1920-character display format • typewriter-style keyboard with 81 specific APL characters:

NA/NA	2,295	12.33

3276 Control Unit Display Stations

Configuration • (not in new production) • standalone display with cluster control capability for 7 additional terminals (see 3270 Controllers section for other particulars on terminal attachments) • Models 1, 2, 3, and 4 are BSC or switch-selectable SDLC/BSC with optional features; Models 11, 12, 13, and 14 are SDLC • attaches to S/360, S/370, 4300, 8100, 3790, and S/3 (see 3270 Controllers section for other particulars) • modular (detached) typewriter, typewriter/APL, typewriter/text, or data entry keyboards.

Display • 14-inch diagonal • 7x9 matrix; 7x8 for Models 4 and 14 • 3440-character, 43-line x 80-character format (Models 4 and 14); 2560-character, 32-line x 80-character format (Models 3 and 13); 1920-character, 24-line x 80-character format (Models 2 and 12); 960-character, 12-line x 80-character format (Models 1 and 11); all have extra status indicator line • 96 EBCDIC or ASCII; 222 APL/EBCDIC character sets • blink or nonblink underscore or block cursor modes.

Edit & Format Features • auto-repeat keyboards • 10, 12, or 24 (12 + 12 shift) user-function keys • cursor up, down, left, right pad; home, new line, tab, backtab, backspace key functions • cursor address write • erase to EOF; clear input, clear • character insert and delete • protected and numeric-only fields • light pen field select • intensity, nondisplay attributes.

Communications • see 3270 Communications section for particulars.

Peripherals • mag card slot reader • up to 7 additional display/printer terminals (see 3270 Controllers Workstation/Terminals and Printers sections for other particulars).

Keyboards • 4621, 4622, 4623, 4624, 4626, 4627, 4628, and 4629.

3276 Model 1 • remote BSC with 960-character display (not in new production).

3276 Model 2 • remote BSC with 1920-character display (not in new production).

3276 Model 3 • remote BSC with 2560-character display:

$306/$243 mo	$5,680 prch	$36.00 maint

3276 Model 4 • remote BSC with 3440-character display:

318/254	5,830	36.50

3276 Model 11 • remote SDLC with 960-character display:

294/234	5,380	30.50

3276 Model 12 • remote SDLC with 1920-character display:

301/240	5,535	31.00

3276 Model 13 • remote SDLC with 2560-character display:

306/243	5,680	31.50

3276 Model 14 • remote SDLC with 3440-character display:

318/254	5,830	32.00

1067 APL/Text • for display of 222-character APL/text set:

45/38	950	1.00

3620 Extended Character Set Adapter • for APL/text feature:

24/21	644	3.00

4999 Mag Reader Control • mag slot card reader for sign-on and credit card-type, numeric input applications:

15/13	379	3.50

1009 Address Keylock • for limiting access to setup and transmission control switches:

NA/NA	56	NC

6360 Selector Light Pen Field Select • for Models 3, 4, 13, and 14 and for Models 1, 2, 11, and 12:

21/17	548	0.50

©1985 Data Decisions

IBM 3270 Series
Information Display System

3277 Display Stations

Configuration • cluster display employed with 3274 control units • modular (detached) typewriter, typewriter/APL, typewriter/text, console, data entry, and data entry keypunch keyboards.

Display • 14-inch diagonal • 7x9 matrix • 1920-character, 24-line x 80-character format • 64 EBCDIC or ASCII; 204 EBCDIC/APL (Model 2) character sets • underscore cursor.

Edit & Format Features • 12 user-function keys • cursor up, down, left, right pad; new line, tab/skip, backtab, backspace key functions • cursor address write • erase to EOF; clear input, clear • character insert and delete • protected and numeric-only fields • light pen field select • intensity, nondisplay attributes.

Communications • via controller—see 3270 Communications section for features.

Peripherals • mag slot ID card reader • cluster printers via controller.

Keyboards • 4630, 4631, 4632, 4633, 4634, 4635, 4636, 4637, 4638, and 4639.

3277 Model 2 • 1920-character display station:

$177/$142 mo	$1,905 prch	$23.00 maint

1066 Data Analysis-APL • for dual-case EBCDIC and APL sets, TN print train character (Model 2 on 3271/3272 controllers):

42/34	300	1.50

4600 Operator ID Mag Card Reader • for sign-on and credit card-type, numeric input applications:

20/16	260	4.00

6340 Security Keylock • for locking terminal and preventing unauthorized system access:

NA/NA	35	NC

1090 Audible Alarm • for program-controlled operator alert or for EOS next-to-last character condition alert:

5/4	87	1.50

6350 Selector Light Pen field select:

40/33	434	2.00

3278 Display Stations

Configuration • (not in new production as of November 1984) • cluster display employed with 3274 and 3276 control units • modular (detached) typewriter, typewriter/APL, typewriter/text, data entry, and data entry keypunch keyboards • intelligent upgrade.

Display • 14-inch diagonal • 7x9 matrix; 7x9 matrix for Models 4 and 5 • 3564-character, 27-line x 132-character format (Model 5); 3440-character, 43-line x 80-character format (Model 4); 2560-character, 32-line x 80-character format (Model 3); 1920-character, 24-line x 80-character format (Model 2); 960-character, 12-line x 80-character format (Model 1); all have extra status indicator line • 96 EBCDIC or ASCII; 222 EBCDIC/APL; up to 6 190-character custom character sets • blink and nonblink underscore and block cursor.

Edit & Format Features • auto-repeat keyboard • 10, 12, or 24 (12 + 12 shift) user-function keys • cursor up, down, left, right pad; home, new line, tab, backtab, backspace key functions • cursor address write • erase to EOF; clear input, clear • character insert and delete • protected and numeric-only fields • selector light pen field select • blink, intensity, reverse video, underscore, nondisplay attributes.

Communications • via controller—see 3270 Communications section for particulars.

Peripherals • mag card slot reader or mag hand scanner • cluster printers via controller.

Keyboards • 4621, 4622, 4623, 4624, 4626, 4627, 4628, 4629, 4640, 4651, and 4652.

3278 Model 2 • 1920-character display station:

$102/$82 mo	$1,965 prch	$10.00 maint

3278 Model 3 • 2560-character display station:

123/99	2,145	10.50

3278 Model 4 • 3440-character display station:

126/101	2,255	12.50

3278 Model 5 • 3564-character display station:

148/118	2,575	12.50

3278 Display Station Upgrades • field-installable model upgrades/changes are available for 3278 Models 1, 2, 3, and 4 on a purchase only basis with no additional installation charge.

3278 Upgrade • Model 1 to 2: $513.

3278 Upgrade • Model 1 to 3, 2 to 3: $517.

3278 Upgrade • Model 1 to 4, 2 to 4, 3 to 4: $564.

3278 Upgrade • Model 1 to 5, 2 to 5, 3 to 5: $982.

5315/5316 Personal Computer Adapter • attaches IBM personal computer to 3278 Models 2, 3, 4, and 5:

RPQ/RPQ	RPQ	NC

5150 Personal Computer • color/graphics monitor adapter or monochrome display and printer adapter • 5.25-inch diskette drive and adapter • 64K-byte memory • DOS1.1 operating system:

NA/NA	1,355	NA

3620 Character Set Extension:

26/22	580	2.50

5790 Programmed Symbols • provides storage for accessing six 190-symbol sets with customer-definable shapes and codes • symbol sets loaded under program control • available for 3278-2 through -4 attached to 3274 having PS Control and Structured Field and Attribute Processing options • requires 3620:

34/29	853	3.50

4999 Mag Card Reader Control • required for interfacing mag scanner or slot reader:

15/13	341	3.50

6340 Security Keylock • for locking terminal and preventing unauthorized system access:

NA/NA	35	NC

6360 Selector Light Pen Field Select • for Models 3, 4, and 5, and Models 1 and 2:

21/18	493	0.50

3279 Color Display Stations

Configuration • color cluster display station employed with 3274 and 3276 control units • modular (detached) typewriter, typewriter/APL, typewriter/text, data entry, and data entry keypunch keyboards.

Display • 14-inch diagonal • 7x9 matrix • 2560-character, 32-line x 80-character format (Model S3G); 1920-character, 24-line x 80-character format (Models S2A and B); all have extra status indicator line • 96 EBCDIC or ASCII; 222 EBCDIC/APL; up to six 190-character custom character sets • 4-color presentation (white, red, blue, and green—Model S2A); 7-color presentation (white, red, blue, green, pink, yellow, and turquoise—Models S2B and S3G) • blink and nonblink block and underscore cursor.

Edit & Format Features • auto-repeat keyboard • 10, 12, or 24 (12 + 12 shift) user-function keys • cursor up, down, left, right pad; home, new line, tab, backtab, backspace key functions • cursor address write • erase to EOF; clear input, clear • character insert and delete • protected and numeric-only fields • light pen field select • 4-color, intensity, nondisplay attributes; 7-color, blink, intensity, reverse video, underscore, nondisplay attributes.

Communications • via controller—see 3270 Communications section for particulars.

Peripherals • mag card slot reader or mag hand scanner • cluster printers via controller.

Keyboards • 4621, 4622, 4623, 4624, 4626, 4627, 4628, 4629, 4640, 4651, and 4652.

©1985 Data Decisions

IBM 3270 Series
Information Display System

3279 Model S2A • 4-color, 1920-character display station:

$170/$136 mo	$3,160 prch	$18.00 maint

3279 Model S2B • 7-color, 1920-character display station:

172/148	3,490	18.00

3279 Model S3G • 7-color, 2560-character display station:

262/209	5,190	22.00

4999 Mag Reader Control • required for interfacing mag scanner or slot reader:

15/13	341	3.50

5322, 5325, 5327 Personal Computer Adapter • provides capability for attaching 5150 Personal Computer • requires 3279-S2A, S3A, S2B, S3B:

RPQ/RPQ	RPQ	NC

3290 Information Panel

Configuration • cluster display employed with 3274 Models 31/41/51/61 control units • detached data/typewriter and APL keyboards; optional numeric and program function key keypads.

Display • flat plasma panel unit • 9920-character, 62-line x 160-character format using 5x8 dot matrix; 5300-character, 50-line x 106-character format using 7x9 dot matrix • multiple display screen can simultaneously display 3178/3179/3180/3278/3279 Model 2 screens; two 3178/3179/3180/3278/3279 Model 3 screens; two 3180/3278 Model 4 screens; or two 3180/3278 Model 5 screens.

Edit & Format Features • no data editing • panel can be organized into 16 separately managed partitions via application program control with vertical scrolling • 24K-character scrolling buffer • up to 4 separate logical regions can be established and interact with host applications or can be designated as a copy area • character size or partition can be enlarged to occupy entire screen • cursor moves between interactive screen partitions to change a displayed partition with 1 off-screen • uses Graphical Data Display Manager for graphs and charts.

Communications • via controller—see 3270 Communications section for details.

Peripherals • cluster printers via controller • BSC copy command not supported.

Keyboards • 4730, 4731, 4830, 4831:

$337/NA mo	$7,100 prch	$30.00 maint

1503 Keyboard Cable • 3 feet long; for 4730 or 4731 keyboard:

3/NA	60	NC

1506 Keyboard Cable • 6 feet long; for 4730 or 4731 keyboard:

4/NA	75	NC

3210 Display Panel • flat plasma panel display medium for 3290 • connects to power-logic unit and keyboard:

171/NA	3,600	10.00

☐ Keyboards

3276, 3277, 3278 & 3279 Keyboards

4621 Keyboard • 75-key, typewriter-type EBCDIC; 11 shift-activated user-program function keys:

$20/$16 mo	$417 prch	$2.00 maint

4622 Keyboard • 75-key, data entry-type EBCDIC; 10 user-program function keys:

20/16	417	3.00

4623 Keyboard • 75-key, data entry keypunch-type EBCDIC; 11 user-program function keys:

20/16	417	3.00

4624 Keyboard • 75-key, typewriter-type ASCII; 12 shift-activated user-program function keys:

20/16	417	2.00

4626 Keyboard • 87-key, typewriter-/APL-type EBCDIC; 12 user-program function keys:

24/18	569	2.50

4627 Keyboard • 87-key, typewriter-type EBCDIC; 24 user-program function keys (12 shift-activated):

24/20	569	2.50

4628 Keyboard • 87-key, typewriter-type ASCII; 24 user-program function keys (12 shift-activated):

24/20	569	2.50

4629 Keyboard • 87-key, typewriter-/text-type EBCDIC; 12 user-program function keys:

24/20	569	2.50

4630 Keyboard • 66-key, typewriter-type EBCDIC:

20/16	309	6.00

4631 Keyboard • 66-key, data entry-type EBCDIC:

20/16	309	7.00

4631 Keyboard • 75-key, typewriter-type EBCDIC • for 3278/3279 operator console with channel-to-channel; used with 4341 only:

54/43	977	5.50

4632 Keyboard • 78-key, console-type EBCDIC; 12 user-program function keys • used with 3277:

52/42	601	17.50

4632 Keyboard • 75-key, typewriter-type EBCDIC • for 3278/3279 operator console without channel-to-channel • used with 4341 only:

52/42	909	5.50

4633 Keyboard • 78-key, typewriter-type EBCDIC; 12 user-program function keys • used with 3277:

47/38	518	9.50

4633 Keyboard • 75-key, typewriter-type EBCDIC • operator console for 3278/3279 • used with 4341 only:

23/19	472	5.00

4634 Keyboard • 66-key, typewriter-type ASCII • for 3277:

20/16	309	6.00

4634 Keyboard • 75-key, typewriter-type ASCII • for 3278/3279 operator console without channel-to-channel; used with 4341 only:

52/42	909	6.00

4635 Keyboard • 78-key, typewriter-type ASCII; 12 user-program function keys • for 3277 only:

47/38	518	9.50

4636 Keyboard • 66-key, data entry keypunch-type EBCDIC; for 3277 only:

22/18	311	7.00

4637 Keyboard • 66-key, typewriter-/APL-type EBCDIC; for 3277 only:

43/35	480	6.50

4638 Keyboard • 78-key, typewriter-/APL-type EBCDIC; 12 user-program function keys; for 3277 only:

68/55	744	9.50

4639 Keyboard • 78-key, typewriter-/text-type EBCDIC; fast cursor and 12 user-program function keys; for 3277 only:

68/55	744	9.50

4640 Keyboard • 87-key, typewriter-type EBCDIC with narrow keytops allowing programmed symbol overlays:

24/20	569	2.50

4651 Keyboard • 87-key, typewriter-type EBCDIC with attribute select, color, and programmed symbol overlays:

25/20	569	2.50

4652 Keyboard • 87-key, typewriter/APL-type EBCDIC with attribute select, color, and programmed symbol overlays:

25/20	569	2.50

©1985 Data Decisions

IBM 3270 Series
Information Display System

4690 Keyboard Numeric Lock • for numeric-only input:

NC/NC	NC	NC

3290 Keyboards

4730 Data/Typewriter Keyboard • EBCDIC typewriter-style keyboard with 24 programmable function keys; requires 1503 or 1506 cable:

$23/NA mo	$440 prch	$6.50 maint

4731 APL Keyboard • same as 4730 but with modified keycaps for entry of 81 APL specific characters; requires 1503 or 1506 cable:

23/NA	440	6.50

4830 Numeric Keypad • key layout in calculator format • attaches to 4730 or 4731 via 2.5-foot cable:

NA/12	250	4.50

4831 Program Function Keypad • provides 24 program function keys for 4730 or 4731; the 24 keys correspond to 24 program function keys on associated keyboard • attaches via 2.5-foot cable:

12/NA	250	4.50

☐ Printers

Serial and line printers employed on 3270 are configured within terminal clusters, or are attached to printer adapter on standalone display models. In addition, certain printer models may also be employed as output-only hardcopy consoles on 8100, 3790, or S/3 processors in non-3270 mode without terminal control units.

The Model 4250 high-resolution, nonimpact printer is an all-points-addressable unit with an addressable resolution of 600 dots per inch in both horizontal and vertical directions. It can print a wide variety of text in various sizes and styles, and produce graphic images. A blackness ratio of 50 percent per page should not be exceeded. According to IBM, the Model 4250 produces typeset quality, camera-ready master pages; it attaches to 3274-31A, -31D, -41A, and -41D controllers only, and runs under VM/CMS(VM/SP), MVS(MVS/SP), and VSE/Advanced Functions.

3287 Printers

Configuration • tabletop serial matrix impact printer • 480/960/1920-character buffer; 2560/3440/3564-character buffer (cost option) • cluster printer terminal for 3274 control units and 3276 displaycontroller (see 3270 Controllers section for other particulars).

Printer • 80-cps (Models 1 and 11) or 120-cps (Models 2 and 12) bidirectional 7x8 matrix impact • 64/96 EBCDIC or ASCII; 222 EBCDIC/APL; up to six 190-character customer character sets • 132 columns • 6/8 lpi • 3- to 15-inch forms tractor; 5- to 6-part forms; 3- to 14-inch form length • 8-to 15-inch form friction feed; single-part forms • page length control.

3287 Model 1 • 80-cps 480/960/1920-character buffer:

NA/NA mo	$4,830 prch	$37.50 maint

3287 Model 2 • 120-cps 480/960/1920-character buffer:

NA/NA	5,150	46.50

3287-11 Printer • 80-cps printer attached to local or remote loops; requires loop adapter and loop locally or data link adapter and 3842 (remote) loop control unit at 3287-11 site; otherwise same as 3287-1:

NA/NA	4,995	41.50

3287-12 Printer • 120 cps; otherwise same as 3287-11:

NA/NA	5,315	50.00

Upgrade • 3287-1 to 3287-2, or 3287-11 to 3287-12: $355.

1066 Data Analysis/APL • dual-case EBCDIC plus APL character set; precludes Page Length Control:

16/14	297	NC

1120 APL/Text • full 222-character EBCDIC/APL character set; requires 3610 ECS feature:

6/5	165	0.50

5781 PS-2 Programmed Symbol • storage for two 190-character symbol sets; requires 3610 ECS and 3880 EPB features:

48/39	826	4.00

5782 PS-4 Programmed Symbol • storage for additional four 190-character symbol sets; requires 3610 ECS, 3880 EPB, and 5781 PS-2 features:

39/32	662	2.50

3610 Extended Character Set • adapter for 1120, 5781, and 5782 features:

22/18	429	3.00

3880 Extended Print Buffer • for accommodating 2560-, 3440-, or 3564-character buffer sizes:

7/6	198	0.50

4110 Friction Feed Platen • for feeding single-part continuous or fan-fold forms:

6/5	151	0.50

8700 Variable-Width Forms Tractor • for feeding 5- to 6-part margin-punched forms:

6/5	151	0.50

8330 3271/3272 Attachment • printer-controller interface:

52/42	860	2.50

8331 3274/3276 Attachment • printer-controller interface:

6/5	165	0.50

4250 Printers

Configuration • nonimpact dot-matrix printer • cluster printer attaches to 3274-31A, -31D, -41A, and -41D.

Printer • 600 dots per inch in both horizontal and vertical directions • all-points-addressable from host processor • print head moves at 40 ips • print time for average A4-size page ranges between 1.5 and 2.5 minutes:

$1,285/$1,205	$21,000 prch	$170.00 maint

5210 Printers

Configuration • tabletop serial printwheel printer • letter-quality printer attaches to 3274 control units and 3276 display controller (see 3270 Controllers section).

Printer • 40-cps (Model G1) or 60-cps (Model G2) bidirectional printwheel • 96 EBCDIC or ASCII character set • up to 48-lpi vertical spacing; 10/12/15 cpi • 132 characters at 10 cpi; 158 characters at 12 cpi; 198 characters at 15 cpi • pinfeed continuous forms up to 15.4 inches wide; maximum print line 13.2 inches • cut sheet feeding optional.

5210 Model G1 • 40 cps:

NA/NA mo	$5,420 prch	$59.00 maint

5210 Model G2 • 60 cps:

NA/NA	5,835	64.00

7850 Continuous Forms Feed Device:

NA/NA	325	8.00

7860 Cut Sheet Feed Device:

85/NA	1,850	22.00

3287 Color Printers

Configuration • tabletop 4-color serial matrix impact printer • 960-/1920-character buffer; 2560/3440/3564-character buffer (cost option) • cluster printer terminal for 3274 control unit and 3276 display controller (see 3270 Controllers section for other particulars) • black, red, blue, and green multicolor ribbon generates display-attribute (protected/unprotected, intensity, etc) related printout, or extended attribute, and/or color display-related printout.

Printer • 80 cps (Model 1C) or 120 cps (Model 2C) bidirectional 7x8 matrix impact; rate reduced in proportion to colors printed for multicolor printout applications • 64/96 EBCDIC or ASCII; 222 EBCDIC/APL; up to six 190-character custom character sets • 132-column for black printout; 120-column, 4-color plus

©1985 Data Decisions

IBM 3270 Series
Information Display System

remaining 12-column base color printout • 6/8 lpi • 3- to 15-inch forms tractor; 5- or 6-part forms; 3- to 14-inch form length • 8- to 15-inch friction feed; single-part forms • page length control • replaceable 4-color ribbon cartridge.

3287 Model 1C • 80-cps, 960-/1920-character buffer color:

$364/$290 mo	$5,210 prch	$42.50 maint

3287 Model 2C • 120-cps, 960-/1920-character buffer color:

427/340	5,530	51.50

3287 Upgrade • Model 1C to Model 2C: $355.

1120 APL/Text • full 222-character EBCDIC/APL character set; requires 3610 ECS feature:

6/5	165	0.50

5781 PS-2 Programmed Symbol • storage for two 190-character symbol sets; selected single-color printout within character location; precludes use of 5783 PS-4A set, and requires 3610 ECS and 3880 EPB features:

48/39	826	4.00

5782 PS-4 Programmed Symbol • storage for additional four 190-character symbol sets; selected single-color printout within character location; precludes use of 5783 PS-4A set, and requires 5781 PS-2, 3610 ECS, and 3880 EPB features:

39/32	662	2.50

5783 PS-4A Programmed Symbol • storage for four 190-character symbol sets; 3 sets allow printout of any color within character location; remaining set allows selected single-color printout within character location; precludes use of 5781/5782 PS-2/4 sets; requires 3610 ECS and 3880 EPB features:

87/70	1,485	11.50

3610 Extended Character Set • adapter for 1120, 5781, 5782, and 5783 features:

22/18	429	3.00

3880 Extended Print Buffer • for accommodating 2560-, 3440-, or 3564-character buffer sizes:

7/6	198	0.50

4110 Friction Feed Platen • for feeding single-part continuous or fan-fold forms:

6/5	151	0.50

8700 Variable-Width Forms Tractor • for feeding 5- to 6-part margin-punched forms:

6/5	151	0.50

3268 Character Printer

Configuration • tabletop, serial wire matrix impact printer • 960/1920/2560/3440/3564-character buffer • cluster printer for 3274 control units and 3276 display-controller (see 3270 Controllers section for additional details).

Printer • 340-cps bidirectional matrix impact • 64/96 EBCDIC or ASCII; 222 EBCDIC/APL • 132 columns • 3/4/6/8 lpi • 10 cpi • up to 16-inch forms tractor • 5- or 6-part continuous forms.

3268 Model 2 • 340 cps • 1920-character buffer:

NA/NA mo	$7,500 prch	$69.00 maint

3268 Color Printer

Configuration • tabletop, 4-color serial matrix impact printer • 960/1920/2560/3440/3564-character buffer • cluster printer for 3274 control unit and 3276 display controller; BSC or SNA LU3 or SCS SNA LU1 • black, red, blue, and green multicolor ribbon generates display-attribute (protected/unprotected, intensity, etc), related printout, or extended attribute, and/or color display-related printout.

Printer • 340-cps bidirectional matrix impact • 64/96 EBCDIC or ASCII; 222 EBCDIC/APL • 132 columns • 3/4/6/8 lpi • 15-inch forms tractor; 6-part forms • vertical spacing under manual, operator panel, or program control • changeable print belts.

3268 Model 2C • 340 cps • 1920-character buffer:

NA/NA mo	$8,990 prch	$92.00 maint

3289 Line Printers

Configuration • product withdrawn from marketing March 1984 • floorstanding character-belt line printer with integral forms stacker • 4016-character buffer • cluster line-printer terminal for 3274 control unit and 3276 display controller (see 3270 Controllers section for other particulars).

Printer • 155-lpm 48-character belt, 120-lpm, 64-character belt, 80-lpm, 94-character belt, or 40-lpm 125-character belt impact (Model 1); 400-lpm, 48-character belt, 300-lpm 64-character belt, 230-lpm, 94-character belt, or 160-lpm, 125-character belt impact (Model 2) • 48/64/96 EBCDIC or ASCII; 125 EBCDIC/text character sets • 132 columns at 10 cpi • 6/8 lpi • 15-inch forms tractor; 6-part forms • vertical forms control • changeable print belts.

3289 Model 1 • 155/120/80/40-lpm belt printer:

$631/$488 mo	$8,830 prch	$104.00 maint

3289 Models 2 & 3 • 160/230/300/400-lpm belt printer:

928/739	13,140	177.00

1130 Text Print • 125-character EBCDIC logic:

7/6	231	NC

1090 Audible Alarm • alert for manual intervention conditions:

6/5	192	NC

3262 Line Printers

Configuration • floorstanding character band line printer • 288-character buffer • cluster line printer terminal for 3274/3276 (Model 13) (see 3270 Controllers section for other particulars).

Printer • 650-lpm, 48-character band, 467-lpm 64-character band, 364-lpm, 96-character band, or 253-lpm, 128-character band impact (Model 3); 325-lpm, 48-character band, 230-lpm 64-character band, 180-lpm, 96-character band, or 125-lpm, 128-character band impact • 48/64/96/128 EBCDIC character sets • 132 columns at 10 cpi • 3/4/6/8 lpi • 16-inch forms tractor • programmed controlled forms skip and advance; 20-ips slew rate • changeable print bands.

3262 Model 13 • 325/230/180/125-lpm band printer:

$499/$398 mo	$12,620 prch	$148.00 maint

☐ Plotters

IBM offers 2 color plotters for use with the 3277 Model 2 workstation. Both interface with the cluster controller via an RS-232C or IEEE 4888 adapter.

7374 Color Plotter

Configuration • tabletop plotter for use with 3277-2; RS-232C/IEEE 4888 interface to 3274 cluster controller.

Plotter • 8-pen plotter • automatic pen capping; fiber tip, roller ball, liquid ink pen types • handles drawings up to 24.5x48.5 inches • paper, vellum, and double-matte polyester media:

$963/NA mo	$15,000 prch	$102.00 maint

7375 Color Plotter

Configuration • tabletop plotter for use with 3277-2; RS-232C/IEEE 4888 interface to 3274 cluster controllers.

Plotter • 8-pen plotter • automatic pen speed, force, and acceleration settings; auto-pen capping; fiber tip, roller ball, liquid ink pen types • handles E/AO size drawings up to 34x44 inches • paper, vellum, double-matte polyester, and foils media:

$1,070/NA mo	$17,500 prch	$107.00 maint

• END

©1985 Data Decisions

IBM 3270 Personal Computer
5271-2, 5271-4 & 5271-6 Systems

■ PROFILE

Function • cluster-attached personal computer handles up to 4 concurrent host sessions • also emulates 3178, 3278 (except Models 2A or 5), or 3279 (except Model 2C) • allows program development or accepts programs written in BASIC, FORTRAN, COBOL, APL, LOGO, and Pascal; macro-assembler optional.

Architectures Supported • attaches to IBM 3274 cluster controller for both local and remote processing; also attaches to 4321, 4331, or 4361 mainframes • all remote 3274s communicate with S/360, S/370, 3030, 3080, or 4300 processors via 3704, 3705, or 3725 communications processors, or via integrated adapters on S/370 Models 115, 125, 135, and 138 or 4300 • BSC/SDLC protocol support • asynchronous adapter for asynchronous communication.

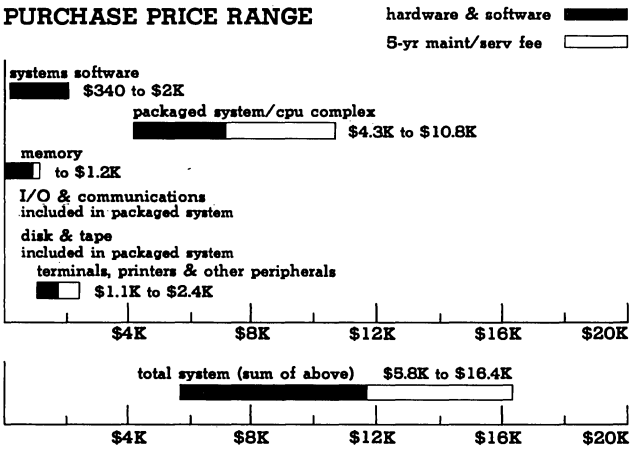
Communications • 3274 communicates with host processor via single point-to-point facility in half-duplex mode • leased or dial-up facilities • data transmission rate up to 56K bps • asynchronous half-/full-duplex point-to-point communication at rates of 50 to 9600 bps.

Operating Systems • 3270-PC Control Program and DOS 2.1 or DOS 2 • DOS 2.0 or 2.1 supports single-user interactive/batch processing in standalone environments or as intelligent workstation; configurations with diskette storage, or DOS 2 is hard-disk based.

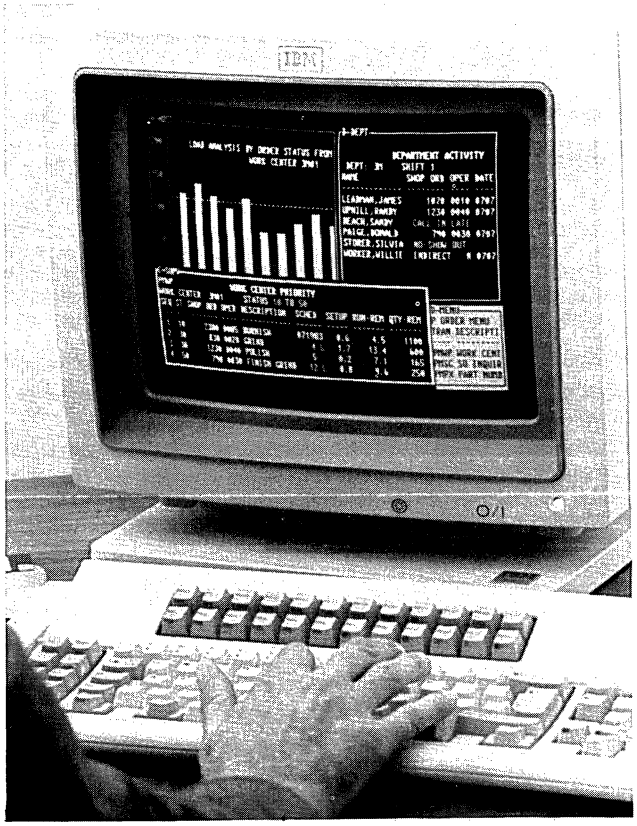
Database • Diskette Librarian; pfs:File, an information management system; pfs:Report, a report generator • file transfer operations supported by communications utility under DOS.

Transaction Processing Management • remotely through 3274 controller • locally through control software of personal computer.

PURCHASE PRICE RANGE



IBM 3270 PERSONAL COMPUTER PURCHASE PRICING bar graphs illustrate price ranges for small to large systems, with solid bars reflecting software/hardware purchase pricing, and open bars reflecting 5-year service/maintenance fees associated with large system • **SMALL SYSTEM** is based on 5271-2 **packaged system** (includes CPU, 256K-byte memory, keyboard, diskette drive, 3274 attachment, and the following options: 3270-PC CP and DOS 2.1 software, display, and printer • **LARGE SYSTEM** is based on 5271-6 **packaged system** (includes CPU, 320K-byte memory, 10M-byte fixed disk, 3274 attachment) and the following options: 3270-PC CP, DOS 2.1 and supporting software, color display, graphics printer. Note: all prices based on single-quantity purchase. Quantity discounts available.



Support Software • read-only-memory-based Cassette Level BASIC interpreter standard; diskette-based Disk/Advanced Level BASIC interpreter and compiler extensions, APL, Logo, Pascal, FORTRAN, and COBOL compilers, and macro assembler optional • extensive system and application software available • database management, high-level compilers, terminal emulator, and communication control software available • thousands of applications packages available from IBM and independent vendors.

Processors • CPU microprocessor consists of Intel 8088; 16-bit internal architecture and 8-bit bus interface • memory capacity is 256K to 640K bytes • up to 2 5.25-inch, 360K-byte diskette drives for a maximum diskette capacity of 720K bytes; or 1 10M-byte 5.25-inch Winchester hard disk drive and 1 diskette • single printer typically; matrix-impact model.

Terminals/Workstations • single-terminal systems; use detached, typewriter-style keyboard and separately available color or B&W display; up to 32 (PC and 3270) physical terminals and 128 logical terminals can be connected to a 3274 depending on the 3274 model.

First Delivery • first quarter 1984.

Systems Delivered • not available.

Comparable Systems • the windowing functions of the 3270-PC

©1984 Data Decisions

IBM 3270 Personal Computer
5271-2, 5271-4 & 5271-6 Systems

are similar to the Apple Lisa, but the micro-mainframe interconnection capabilities of the 3270-PC are unique.

Vendor • International Business Machines (IBM) Corporation, Information Systems Group • National Accounts Division; 1133 Westchester Avenue, White Plains, NY 10604; 914-696-1900 • National Marketing Division; 4111 Northside Parkway, Atlanta, GA 30327; 404-238-2000.

Distribution • nationally through: IBM local sales offices; IBM Product Centers; Product/Service Centers located in San Francisco, CA; Baltimore, MD; and Philadelphia, PA; other service locations in Los Angeles, CA; Washington, DC; Chicago, IL; Boston, MA; Detroit, MI; New York, NY; Dallas, TX; Houston, TX; and Seattle, WA; National Support Center located in Greencastle, IN.

■ ANALYSIS

The introduction of the 3270-PC in October 1983 tied together a developing communications thread in the PC product line, and at the same time started a whole new display slant. The 3270-PC, like standard PCs with appropriate attachment features, can attach to a 3274 communication controller or 4300 display printer adapter by coaxial cable. Instead of this being an add-on feature, the attachment to the 3274 is the primary focus of the system. The most unusual feature of the 3270-PC, when compared to other PCs, is the large number of concurrent operations possible, and the windowing feature on the screen which allows the user to see all active processes in overlapping windows. Up to 4 concurrent host sessions, a PC-DOS session, and 2 local scratch pad sessions can all be active at the same time. All of the windows except the DOS window can transmit data into any of the other windows; all windows including DOS can receive from any of the other windows. The keyboard can connect into any window for an interactive session while the applications related to other windows are processed in the background. The use of a color screen allows the user to color code the various windows.

Two recent announcements from IBM extend the 3270-PC to create business graphics, and to display images targeted for IBM's Scanmaster facsimile system. The image view facility operates as a CICS program running under the Graphical Data Display Manager, Release 3. Other required software in the host includes DISSOSS/MVS/PS and a PL/1 transient library.

The graphics capability allows the PC to be used to create pie charts, bar graphs, and other business graphics from a program in the host or one loaded into the PC via diskette. The host-interactive business graphics are provided under the distributed function terminal mode. Hardware-software requirements to support business graphics requires that the host run the Graphical Data Display Manager, and that the 3274 control unit configuration be T- or D-level support and have a minimum storage of 128K and 192K bytes, respectively.

The operation of the 3270-PC is governed by two modes, which are determined in part by the way the system is attached to its host. If the PC is attached to a 3274 with configuration support T or D it may operate in distributed function terminal mode, invoking 1 to 4 sessions (logical units) and emulation of the 3178, any 3278 except 3278-2A or 3278-5, or any 3279 except 3279-2C. If the PC is attached to any 3274 or to the display/printer adapter on the 4321, 4331, or 4361, and is emulating the 3178, 3278-2, or 3279-S2A, it can operate in control unit terminal mode with a single session (logical unit). In either mode the 3270-PC supports 2 local notepad sessions, and 1 PC-DOS 2.1 session.

The 3270-PC local configuration is like a restricted version of the PC/XT but with greatly enhanced display capabilities and a micro-mainframe connection. The restrictions refer to the rigidly defined basic systems which can attach 1 display, 1 keyboard, up to 640K bytes of memory, the 3270 connector, a printer, a hard disk, and a diskette drive—but, at the current time, no expansion unit.

Connection to a local or remote mainframe is supported by file transfer software running under VM or MVS. Logically enough, considering the mainframe communications orientation of the system, it is sold only by IBM's direct sales force rather than through micro retail outlets.

☐ Strengths

The 3270-PC combines the personal computing capabilities of a PC-DOS system together with a versatility in handling and displaying concurrent operations that is unique to nearly all of IBM's comparably priced displays. The ability to handle 7 "windows," 4 of which can be concurrent active host-corrected sessions, also makes the PC the nexus of a variety of host data paths. This 3270-PC attachment, like other types of 3270-PC 3270-attachments, adds local file storage and manipulation to the host-controlled 3270 systems. Up to 4 logical terminals can be defined for each single physical terminal, expanding the 3270 capacity to 128 logical terminals.

The 3270-PC, although it has a number of differences from other "standard" PC models, records files in standard DOS formats, allowing easy exchange of data, and use of PC virtual files on a variety of hosts.

☐ Limitations

The most obvious limitation for the 3270-PC is the lack of file transfer support under DOS/VS or DOS/VSE, IBM's largest user base. File transfer software only runs under MVS or VM.

Although the 3270-PC display provides more capabilities than other PC systems, and the 3274 attachment allows a very flexible communications environment, the 3270-PC is, initially at least, bounded by I/O restrictions that appear to be arbitrary. IBM has set up a formally specified configuration to the point of designating which device adapter is to be attached to which slot. The high-end Model 6, which has a fixed disk, a diskette drive, and a printer adapter in addition to the keyboard, memory, display, and 3270 system attachments, has room for only one more option—a slot that must be filled by a memory board if system memory is to be expanded beyond 512K bytes.

The only contending option on the standard features list is an asynchronous communications adapter. This means that although the disk and diskette adapters can each theoretically attach a second drive, there is no way to attach an IBM drive because the add-on IBM drives are designed to be housed in an expansion unit—which is not on IBM's list of standard features. Alternatively, the user is responsible for testing PC options not included with the 3270-PC; IBM does not accept responsibility for them.

The attachment of a PC can impact the 3270 system cluster performance. If the PC is connected to a local channel-attached control unit (3274-31A, 31D, 41A, or 41D) running in Control Unit mode, response time may be increased up to 100 milliseconds. During file transfers in Control Unit Terminal mode there may be a noticeable impact on the response time of other terminals in the 3270 system. In an attempt to minimize this impact, the 3270-PC File Transfer program transfers files in 2000-byte blocks.

A number of 3270 capabilities are not available on the PC. The PC does not support attachment of the 3270 selector light-pen, magnetic reader control and accessories, or video output. It does not have the range of 3270 keyboard types, Katakana characters, APL/TEXT character set, and various RPQs. It does not supply base 4-color copy to the 3274 attached printer, nor the port 0 customization function on the 3274 control unit. It does not support the 3274 Entry Assist feature, binary synchronous copy command, explicit partitions, graphics escape, keyboard clicker, monocase switch, numeric lock, programmed symbols, security keylock, or 3270 diagnostic reset dump. It does not emulate the 3278-5.

Most PC applications can run under DOS 2.1 concurrently with the 3270 sessions, but they must not include APA graphics statements or use PC-DOS 2.0 or 2.1 print spooling. PC-DOS programs cannot disable storage addresses above the interrupt level 12 pointer in BIOS except when they are referencing the PC display refresh buffer. Applications must not issue instructions to the 6845 display adapter/controller; nor must they reprogram the 8259 interrupt controller, disable interrupts, mask selected

 ©1984 Data Decisions

IBM 3270 Personal Computer
5271-2, 5271-4 & 5271-6 Systems

interrupt levels for more than 100 milliseconds, or fail to issue an end-of-interrupt or IRET on a hardware interrupt level.

■ COMMUNICATIONS FACILITIES OVERVIEW

☐ Distributed Communications

The 3270-PC operates in native mode and/or can emulate IBM 3178, 3278 (except Models 2A or 5), or 3279 (except Model 2C) workstations. The PC is intended primarily for use with the 3270 Information Display System, and operates under control of 3274 Models 31A, 31D, 41A, or 41D for local (host attached) operation and Models 21C, 31C, 41C, 51, and 61C for remote communication. All communication between cluster controller and host is point-to-point over leased or switched lines at speeds up to 56K bps, half-duplex. Both BSC and SDLC protocols are supported. The PC transmits at 50 to 9600 bps.

The 3270-PC can also be ordered with an asynchronous communication adapter, a single-port half-/full-duplex module which provides RS-232C or 20-mA current-loop signal levels. Software-selectable data rates of 50 to 9600 bps; 5- to 8-data bits; 1 start bit; or 1 or 2 stop bits; odd, even, or no parity are supported. System-interrupt generation is optional.

The PC attaches as a Category A terminal to the 3274 controller. It also can be attached to a 4321, 4331, or 4361 mainframe via its display/printer adapter.

The operation of the 3270-PC is governed by two modes, which are determined in part by the way the system is attached to its host. If the PC is attached to a 3274 with configuration support T or D it may operate in distributed function terminal mode, invoking 1 to 4 sessions (logical units) and emulation of the 3178, any 3278 except 3278-2A or 3278-5, or any 3279 except 3279-2C. If the PC is attached to any 3274 or to the display/printer adapter on the 4321, 4331, or 4361, and is emulating the 3178, 3278-2, or 3279-S2A, it can operate in control unit terminal mode with a single session (logical unit). In either mode the 3270-PC supports 2 local notepad sessions, and 1 PC-DOS 2.1 session.

☐ Distributed Configurations

The 3270-PC is officially called the 5271 System Unit and consists of 3 models. Model 2 includes 256K bytes of RAM (expandable to 640K), 5151/5272 display adapter, 5271 keyboard, 3270-PC keyboard/timer adapter, a dual-sided diskette drive and adapter (360K bytes), 3270 system adapter, and DOS 2.0 operating system. The Model 2 (and Models 4 and 6) requires a 5151 monochrome or 5272 color display, 3270-PC control program, and PC-DOS 2.0 or 2.1 operating system.

Model 4 includes all standard Model 2 features plus a second dual-sided diskette drive, an aditional 64K bytes of RAM (320K bytes total), and an adapter for a 5152 Graphics Printer. Model 6 includes all standard Model 2 features, plus a 10M-byte fixed disk, an additional 64K bytes of RAM (320K bytes total), and an adapter for a 5152 Graphics Printer.

IBM allows the 3270-PC's main memory to be expanded up to 640K bytes, and allows the substitution of a second diskette in lieu of the hard disk on Models 4 and 6.

Up to 32 PCs can be attached to a 3274, with each physical PC designated with from 1 to 4 logical addresses. It should be noted that Category B terminals (e.g., 3277) cannot be used on the same 3274 when PCs are attached and operating in distributed function terminal mode.

☐ Distributed Communications Utilities

The 3270-PC Control Program is the primary communications handler for the 3270-PC (see Operating Systems). This program supports BSC and SDLC protocols in non-SNA and SNA environments. The 3270-PC can also attach an asynchronous adapter for asynchronous communications support. Prices shown here are for single units. See Software Terms & Support for Volume Licensing Agreement discounts.

6024032 Asynchronous Communications Support • terminal-emulation and file-transfer utility manages communications with systems supporting TTY ASR 33/35 or equivalent data transmission procedures • user-/program-selectable communications parameters include: 75- to 2400-bps data rate; parity; number of stop bits; line-output turnaround characters; half- or full-duplex operation; XON/XOFF operation • tested for operation with VM/370 Release 6 and VM/Systems Product Release 1 on IBM System/370 Model 158 with IBM 3705 communications equipment • requires: DOS; 64K-byte main memory; 1 diskette drive; 1502074 Asynchronous Communications Adapter, and full-duplex modem; requires 128K-byte memory when used with fixed disk:

$60 lcns

6024042 3101 Emulation • emulates 3101-20; allows conversion of ASCII diskette files to and from binary format • requires 64K-byte user memory, 1 diskette drive, asynchronous communications adapter, DOS 1.1; when program and/or its data files are on fixed disk, requires 128K-byte memory and DOS 2.0; also requires full-duplex modem or necessary cabling for direct connect to local host computer:

140

6024100 Personal Communications Manager • electronic mail package with auto-dial support for an external modem like Hayes Smartmodem • capabilities include mail management (scheduling, checking, reports), mail logging (time, sender, subject), mail review; mailbox address can be by alphanumeric name containing mailbox name, addressee's name, telephone number, and modem speed • communications features supported included both tone and pulse dialing, 300- or 1200-bps speed, guaranteed accurate transmission; selectable features for half-/full-duplex, parity, transmission rate, flow control, etc • provides for user-defined function keys • user-specified editor can be accessed • requires PC with 128K-byte memory; one dual-sided diskette drive; monitor adapter, modem, and appropriate adapter; the required portions of DOS are already on the diskette, so DOS is not required:

100

6428147 Batch Communication Program • allows PC users to transmit files of transactions on switched networks to host CICS and IMS applications; particularly useful for remote collection and distribution when host access is of short duration • SNA/SDLC communications, auto-answer, attended or unattended operation; multiple sessions within one telephone call; automatic session recovery with message synchronization • requires a PC with DOS operating system, diskette drive; central service available until December 31, 1985:

350

5664-281 3270-PC File Transfer Program • allows transfer of files from IBM S/370, 4300, 303X, or 308X host to a 3270-PC, PC, or PC/XT coaxially attached to a 3274 control unit or to the display/printer adapter on the 4321, 4331, or 4361; also allows PC to host transfer, off-line data manipulation, updating, or correction on the PC • this program runs on the host, requires VM/SP R.2.1 operating environment • supports either the 3270-PC running under 3270-PC Control program or the PC 1 or PC/XT running under the 3278/79 Emulation Control Program; in both environments the PC must be running DOS 2.0 or 2.1:

600

5665-311 3270-PC File Transfer Program • same functions and hardware requirements as 5664-281, but requires MVS/TSO (MVS/SP) operating environment in host:

600

■ SOFTWARE

☐ Terms & Support

Terms • software products are available on a one-time license-fee basis; license permits the use of the licensed product on a single IBM Personal Computer system, the copying/modification of the licensed product (except for copy-protected products), and the transfer of the license and product to another party • quantity discounts are available under the Volume Licensing Agreement (VLA); users ordering program products in quantities of 20 or

LCNS: one-time license fee. Software maintenance is not available. Prices effective as of May 1984.

 ©1984 Data Decisions

IBM 3270 Personal Computer
5271-2, 5271-4 & 5271-6 Systems

more are charged a one-time license fee per copy of program product less a volume discount.

Support • program products are licensed as-is, without warranty; only diskettes are warrantied against defects in materials and workmanship for a period of 3 months • telephone assistance is available for a period of 3 months after the date of installation from the ISD Personal Computer Assistance Center.

☐ Overview

The 3270-PC is controlled by the 3270-PC control program, a multitasking communications executive that allows PC-DOS 2.0 or 2.1 to run as one of the concurrent system tasks.

In addition, IBM also provides database management facilities, high-level programming languages, plus utilities supporting creation/modification of source language files, debugging utilities, and program development aids.

☐ Operating Systems

6024120 IBM Personal Computer Diskette Software (DOS Diskette) Version 2.1 • includes: IBM Disk Operating System (DOS); Disk and Advanced Level BASIC 2 language extensions to read-only-memory-based Cassette Level BASIC; editor, debug, and linkage utilities • see Operating Systems:

$65 lcns

1837434 3270-PC Control Program • establishes an umbrella or virtual machine type of environment that provides for concurrent operation of a PC-DOS partition, 2 scratchpad sessions and 1 to 4 host-interactive sessions • all active sessions can be displayed simultaneously on the screen providing multiple windows on system activities • the 3270-PC CP set-up defines a control unit terminal mode or distributed function mode (see System Overview) during 3274/3270-PC customization • management control features provide flexible screen manipulation (see Terminals/Workstations) • 3270-PC CP supports file transfer program product; allows data to be copied to/from any window into any other window, except the PC window can only receive data but not send it • 3270-PC CP requires 5271 system unit, keyboard, 5151 or 5272 display and DOS 2.1 • memory residence, and hence overall system memory requirements, depend on the terminal mode, number of sessions, and session screen sizes; PC-DOS 2.1 requires 24K bytes; 3270-PC applications under DOS require 8,320 bytes for save/restore, 15,870 bytes for file transfer, 6,656 bytes for patch and 25,088 bytes for tutorial for a subtotal of about 80K bytes; to this must be added 94,116 bytes for control unit terminal mode, 145,828 bytes for non-SNA distributed function mode or 156,708 bytes for SNA distributed function mode yielding a subtotal of 174K to 236K bytes; in addition each host session must dedicate an area based on screen size and number of colors, ranging from 1,968 for a 4-color 1920-character base screen up to 6,966 bytes for an 8-color, EDS, 3440-character screen; to this is added 3,840 bytes for each scratchpad and 2,000 bytes or more for the PC-DOS session:

300

IBM Disk Operating System (DOS) Versions 2.0, 2.1 • general-purpose diskette operating system supports single-user interactive and batch processing; provides high-level interface between user software and associated hardware environment • sequential and random file access and dynamic space allocation • user-accessible functions include: diskette-directory display; file rename, erase, display, compare, and copy; chaining of diskette-based programs in predefined job streams; designation of single program or job stream for automatic execution after system startup • includes Linkage Editor, Editor, and Debug utilities • capability of handling hard disk drives • formats diskettes at 9 sectors per track for a capacity of 184,320 characters on single-sided diskettes or 368,640 characters on double-sided diskettes • normally allocates 2 disk or diskette buffers at start-up time but will allow user to specify number of buffers to reserve • provides tree-structured directories • extended screen and keyboard control; redefines the keyboard • redirects I/O • provides piping functions and filters • includes such new commands as backup, RESTORE, RECOVER, VERIFY • enhanced commands for debug, erase, format functions, others • Version 2.1 adds support of the PCjr as well as PC 1, PC/XT, etc; supports chaining of files in a predefined job stream with the whole jobstream or a single program being designated for automatic execution when the system is turned on; also can display a diskette directory, rename, erase, display, compare, or copy files; includes line editor, debug, and linker utilities • requires minimum of 64K bytes on diskette-based systems; 128K bytes when using a hard disk system • 128K bytes is also recommended on any system with fixed disks; DOS 2.1 (as well as DOS 2.0) resides in 24K bytes of memory:

NA

☐ Database Management

6024111 Fixed Disk Organizer • development tool that uses simple menus to help the user organize the fixed disk; allows the user to create complex batch files and link current applications through user-defined menu options; can produce online Help text; establishes passwords to prevent unauthorized access • requires DOS, 128K-byte memory on PC 1 or PC/XT, 1 fixed disk, 1 diskette, display:

$50 lcns

6024062 Personal Computer File Command • file management system using display of a file directory with a multiline command area to issue DOS commands and execute programs; directory can be sorted by file size, by alphabetical order, by date, or by drive or directory path; assigns commands to function keys • commands can be associated with file names allowing automatic subdirectory listings, single keystroke execution of frequently used programs, fast entry • requires PC with 64K-byte memory, one diskette monitor:

35

6024050 Diskette Librarian • creates and maintains a catalog of file names over multiple diskettes • requires 64K-byte main memory, 1 diskette drive, DOS:

45

6024041 pfs:FILE V.1, V.1.05 • information management system; enables the user to design a form and enter, retrieve, modify, and print information • requires 64K-byte main memory, 2 diskette drives for diskette version; when program and/or its data files are stored on fixed disk, requires 128K-byte memory, DOS • V.1.05 required under DOS 2.1:

140

6024045 pfs:REPORT V.1, V.1.05 • produces reports from files created by pfs:FILE; handles up to 16 column reports • requires pfs:FILE, 64K-byte main memory, 2 diskette drives for diskette version; when program and/or its data files are stored on fixed disk, requires 128K-byte memory • V.1.05 required under DOS 2.1:

125

☐ Program Development/Languages

Standalone Languages

The BASIC language described below runs independently of disk/diskette operating systems.

Cassette Level BASIC • interpreter supports subset implementation of Dartmouth BASIC; resident in 40K bytes of read-only memory (ROM) • provides driver and sequential-file facilities for cassette-tape ancillary storage; supports I/O functions for display, keyboard, printer, and customer-supplied light pen and joystick • features include: 16-color-foreground/8-color-background graphic-display I/O; 17-digit numeric precision; integer, real, and string variables; single- and double-precision floating-point variables; variable names up to 40 characters in length; up to 250 characters per program line; multiple statements per program line; comments on program lines; automatic line numbering; full-screen editing; error trapping • 4K bytes of programmable main memory used as system workspace; maximum of 60K bytes of addressable user workspace • included in all packaged systems • developed by Microsoft, Inc.

 ©1984 Data Decisions

IBM 3270 Personal Computer
5271-2, 5271-4 & 5271-6 Systems

IBM Disk Operating System Program Development

All of the program development utilities described below, except for the BASIC Programming Development System, are available as part of the 6024001 or 6024061 IBM Personal Computer Diskette Software (DOS Diskette) packaged software (see Packaged Software section). The utilities support program development using the 6024010 Pascal Compiler, 6024012 FORTRAN Compiler, 6024002 Macro Assembler, 6024011 COBOL compiler, and 6024003 BASIC compiler.

EDLIN Editor • supports creation/modification of source-language files.

Debug Utility • supports program testing and debugging at assembly language level.

Linkage Editor • supports conversion of compiler—or assembler-produced relocatable modules to executable load modules.

6024046 BASIC Programming Development System • contains text file editor, Structured BASIC preprocessor, BASIC formatter, BASIC cross-reference • requires 96K-byte main memory, 2 diskette drives, DOS:

$130 lcns

IBM Disk Operating System Languages

Languages described below run under the IBM Disk Operating System (DOS).

Disk Level BASIC • diskette-based extension to Cassette Level BASIC described above • provides instructions, commands, and built-in functions to support IBM Disk Operating System (DOS); includes date, time-of-day, and communications capabilities • with default communications option, occupies 25.5K-byte main memory; without communications option, occupies 24K-byte main memory; requires 32K-byte main memory and 1 diskette drive • available as part of 6024001 IBM Personal Computer Diskette Software (DOS Diskette) packaged software (see Packaged Software section) • developed by Microsoft, Inc.

Advanced Level BASIC • diskette-based extension to Cassette Level BASIC described above • includes all Disk Level BASIC functions and also supports: display graphics; customer-supplied light pen and joystick; interrupt handling for communications, function keys, light pen, and game controllers; variety of external hardware devices • includes Graphics Macro Language and Music Macro Language • with default communications option, occupies 30.5K-byte main memory; without communications option, occupies 29K-byte main memory; requires 32K-byte main memory and 1 diskette drive • available as part of 6024001 IBM Personal Computer Diskette Software (DOS Diskette) packaged software (see Packaged Software section) • developed by Microsoft, Inc.

BASIC 2 • hard disk-based extension to Advanced Level BASIC • requires 64K bytes of memory, 1 diskette drive, and hard disk • available as part of 6024061 DOS 2 software package • developed by Microsoft, Inc.

6024003 BASIC Compiler • diskette-based compiler version of IBM Advanced Level BASIC • includes all Advanced Level BASIC functions • requires: DOS; 64K-byte main memory; and 1 diskette drive; when program and/or its data files are stored on fixed disk, requires 128K-byte memory and DOS 2.0 or 2.1 • developed by Microsoft, Inc:

$300 lcns

6024010 Pascal Compiler • compiler supports implementation of International Standards Organization (ISO) Working Draft #6 for Pascal language with the exception of conformant array parameters; super array parameters are provided instead • requires: DOS; 128K-byte main memory; and 2 diskette drives; program and/or its data files can also be stored on hard disk • developed by Microsoft, Inc:

300

6024012 FORTRAN Compiler • compiler supports implementation of ANSI standard X3.9-1978 (subset level) and features from ANSI X3.9-1978 (full level) • features include: combining object modules with subroutines in Pascal or macro assembler; 2-pass compilations; compiler metacommands; edit control • requires: DOS; 128K-byte main memory; and 2 diskette drives; program and/or its data files can also be stored on hard disk • developed by Microsoft, Inc:

350

6024077 APL, A Programming Language • general-purpose language used for mathematical and scientific computing:

195

6024076 LOGO • for developing problem-solving skills and introducing programming concepts to children and adults • marketed through LOGO Computer Systems • available fourth quarter 1983:

175

6024002 Macro Assembler • 8088 macro assembler generates relocatable code • features include: listings that include start and end addresses, line numbers, and alphabetic cross-reference; compatibility with BASIC, Pascal, and FORTRAN programs • package includes full and subset versions of macro assembler • requires: DOS; 96K-byte main memory for full version or 64K-byte main memory for subset version; and 1 diskette drive; when program and/or its data files are stored on fixed disk, requires 128K-byte memory, DOS 2.0 or 2.1 • developed by Microsoft, Inc:

100

6024011 COBOL Compiler • compiler supports ANSI X3.23-1974 COBOL standard • extensions support color and screen formatting • requires: IBM Disk Operating System; 64K-byte memory; and 2 diskette drives; when program and/or its data files are stored on fixed disk, requires 128K-byte memory, DOS 2.0 or 2.1 • developed by Microsoft, Inc:

700

UCSD Macro Assembler • 8088 macro assembler generates relocatable code • features include: macro parameters; conditional assembly; production of code to be linked to UCSD Pascal, FORTRAN, and BASIC programs • included in 6024016 UCSD p-System with UCSD Pascal, and 6024017 UCSD p-System with FORTRAN 77.

☐ Other Facilities

6025072 Hardware Maintenance & Service • fault-isolation program for hardware components, including System Unit, 5151-001 Monochrome Display, 1501100 Keyboard, and 5152001 80-cps Matrix Printer • requires Cassette or Disk/Advanced Level BASIC:

$155 lcns

☐ Application Packages

There are thousands of application packages on the market that run on the PC. Many are offered by independent vendors. The packages offered include payroll, accounts payable/receivable, spreadsheets, job cost, general ledger, inventory control, and word processing.

■ HARDWARE

☐ Terms & Support

Terms • hardware products are available for purchase only and include a 90-day warranty; 3270 products can also be leased • the National Accounts Division and National Marketing Division both sell to the end user in single or volume orders (VPA) of 20 or more, or in pilot orders leading to a VPA of 20 or more; VPA orders can be for the basic system or for packaged systems; non-VPA orders can only be for basic systems • quantity discounts are available under the Volume Purchase Amendment (VPA); quantities of 20 to 49 systems are subject to a 12% discount; quantities of 50 to 149, a 16% discount; quantities of 150 to 249, a 20% discount; 250 to 499, a 24% discount; 500 to 999, a 27% discount; and quantities of 1,000 or more, a 30% discount • VPA contract period is 12 months.

Support • on-site, courier pick-up, carry-in, and mail-in maintenance contracts available; Warranty Extension Option provides pickup/delivery maintenance coverage for the entire

 ©1984 Data Decisions

IBM 3270 Personal Computer
5271-2, 5271-4 & 5271-6 Systems

first year at a lower cost than the usual carry-in/mail-in annual contract • annual option provides pickup/delivery maintenance coverage for subsequent years • carry-in and mail-in maintenance contracts for subsequent years are also available • on-site contracts are available in cities having an IBM service/exchange center • to obtain maintenance service, user must provide IBM National Support Center with results of 6025072 Hardware Maintenance and Service fault-isolation procedures (see Software—Other Facilities section); malfunctioning units can then be sent to IBM Product/Service Centers, IBM Customer Service Division (CSD), designated service locations, authorized IBM Personal Computer Dealers, or the IBM National Support Center in Greencastle, IN; IBM will repair System Units within 2 days and repair or replace printers, displays, keyboards, and other types of devices within 24 hours; all non-IBM devices must be removed from defective units prior to obtaining maintenance service.

☐ Systems Overview

The 3270-PC is a highly defined, specialized version of the PC designed to be attached to a 3274 control unit in local-attach environments. It can also be attached to the display/printer adapter on 4321, 4331, or 4361 mainframes. The 3270-PC adds local intelligence and multiple logical terminal capability to the 3274; it can handle 4 active host sessions in addition to the PC-DOS, and 2 scratchpad sessions. Since the 3274 has only one physical line, the multiple host addressing capability has to be implemented via the front end.

The 3270-PC still maintains only one session that the keyboard can connect to, but a total of 7 sessions can be displayed simultaneously on the screen "windows." The display used is the 5151 or 5272 IBM monitor, not the 3270 series displays. The PC connects directly to the 3274 control unit.

3270-to-Processor Local Attachment

Local host processor attachment is via selector, byte multiplexer, or block multiplexer channel on the S/370 models and via byte multiplexer or block multiplexer channels on 3030, 3080, 4341, and 4381 processors with 3270 control unit attached to 1 of 8 positions on channel interface (note that IBM does not recommend non-DDC subchannel attachment to block multiplexer channel or to selector channel because of less than maximum throughput considerations) • the 3270 can locally attach to a display adapter or to the byte multiplexer on the 4321, 4331, or 4361 • CPU channel provides 3270 control unit with display/print data, and with control instructions needed to operate attached terminal devices • terminal buffers store data forwarded via control unit for display/print or modification • local-attached 3270 control units may be positioned no more than 200 feet from processor channel • all 3274 Models control units except the "C" models are used for local attachment.

Remote host processor attachment is via communication facilities to channel-connected transmission control units/adapters; however, certain remote 3270 control units can communicate via communication controllers or adapters without recourse to modem or communication facilities in a direct-connect mode (see 3270 Controllers and Communications sections for other particulars).

3270-to-Terminal Device Attachment

The 3274 attaches Category B terminals via direct cable connection at distances up to 2,000 feet from terminal adapter • 3274 Category A terminals can be located up to 4,900 feet from controller.

3270 Communications Attachment

The 3270 display system communicates with a remote processor via half-duplex data transmission on a single point-to-point half-/full-duplex or multipoint full-duplex facility in BSC and/or SDLC protocol • dedicated (leased) private line facilities can be employed with any 3270 control unit • switched (dial) public telephone facilities can also be employed with certain 3274 models • IBM or independent vendor-supplied modems can be employed.

All remote 3270 models communicate with S/360, S/370 (including 3030 and 3080), or 4300 processors by transmitting to a channel-attached 3704, 3705, or 3725 communication front end; they can also transmit to integrated adapters on the S/370 Models 115, 125, 135, and 138 or on the 4300 (1601 ICA). Only 1 remote host processor may be directly attached to a 3270. 3270-type display printer and line printer terminals cannot remotely attach to 3270 control units via transmission line facilities.

System Maximums

System Maximums • 640K bytes of memory, 1 10M-byte fixed disk and 1 360K-byte diskette drive or 720K bytes on 2 diskette drives; one printer; one display; one keyboard and communications link to 3270 system • 3270 can have up to 128 logical terminals on up to 32 physical terminals • other PC options, specifically an asynchronous line adapter are supported by requiring supplanting of another option in the expanded system described above.

☐ Packaged Systems

5271 Base System Unit • includes CPU, memory expandable to 640K bytes, and integrated adapters for connecting keyboard, diskette, display, and the 3270 system; basic system has eight expansion slots, basic system features implemented leave from 1 to (Model 6) to 4 (Model 2) slots available for options determined by the user.

5271-2 System Unit • includes 5271 Base System Unit, 256K bytes of main memory, keyboard, one dual-sided diskette drive, documentation • standard features use 4 of the 8 option slots • requires 5151 monochrome or 5272 Color display, 3270-PC Control Program and PC-DOS 2.0 or 2.1:

$4,290 prch $378/$244/NA/NA maint

5271-4 System Unit • includes 5271 Base System Unit and all 5271-2 features but with 320K-byte memory, 64/256K adapter, second diskette drive, and graphics printer adapter • standard features use 6 of the 8 option slots:

5,319 514/330/NA/NA

5271-6 System Unit • includes 5271 Base System Unit and all 5271-2 features but with 320K-byte memory and 64/256K-byte adapter, 10M-byte hard disk with adapter, and printer adapter for attachment of 5152 graphics printer as standard features • standard features use 7 of the 8 option slots • requires 5151 Monochrome or 5272 Color Display, 3270-PC Control Program and PC-DOS 2.0 or 2.1:

7,180 723/466/NA/NA

☐ CPU

The IBM 3270 Personal Computer is based on the Intel 8088 microprocessor. For PC 1 and PC/XT users who need to perform floating-point arithmetic, logarithmic, and trigonometric functions, IBM offers an 8087 math coprocessor option, but this option is none of those formally offered for the 3270-PC. IBM states that it does not accept responsibility for options it has not formally endorsed.

Intel 8088 Processor • 8-bit data bus interface, 16-bit internal architecture, direct addressing to 1M bytes of memory, 16-bit register set with symmetrical operations, 24 operand addressing modes, 8-bit and 16-bit signed and unsigned arithmetic with binary and decimal operands • 210-nanosecond cycle time; 4.77-MHz clock speed.

☐ Memory

5271-2 Main Memory • 256K bytes on a system board; 64K-bit chips with parity checking, 250-nanosecond access time;

PRCH: purchase price. MAINT: annual charge for maintenance coverage; first figure is on-site maintenance, second figure is for annual pickup/delivery option, third figure is for carry-in repair, and fourth figure is for mail-in. NA: not available. NC: no charge. Prices effective as of May 1984.

 ©1984 Data Decisions

IBM 3270 Personal Computer
5271-2, 5271-4 & 5271-6 Systems

memory expandable to 512K-byte using 64K/256K-byte Memory Expansion Board or to a maximum of 640K-byte using two expansion boards.

5271-4 & 5271-6 Main Memory • 320K bytes; the first 256K bytes are on the system board and the next 64K bytes are on a 1501013 64K/256K-byte memory board with 1 of the 4 possible 64K-byte modules implemented; the 1501013 board takes up one option slot although it is a standard feature; expansion to 512K-byte using 3 more 64K-byte modules on the 1501013 board; a second (optional) 1501013 board, using one more option slot, is needed to expand from 512K bytes to 640K bytes.

1501013 64K-/256K-byte Expansion Option • allows 3270-PC to be expanded beyond the 256K-byte capacity of the initial system board • single circuit card capable of carrying four 1501003 64K-byte modules; one board with a 64K-byte module is implemented in the basic Model 4 and Model 6 systems as a standard feature • 2 expansion cards can be added to the Model 2 system and 1 to Models 4 and 6 in addition to the initial memory card(s) in order to expand from 256K bytes to 512K bytes and from 512K bytes to 640K bytes; the memory ceiling of 640K bytes means that last card can carry only 2 modules:

$325 prch	$38/$30/$24/$21 maint

1501003 64K-byte Module • provides 64K-byte plug-in module; attaches to 1501013 Expansion Board:

168	NC/NC/NC/NC

3270-PC ROM • 40K bytes • includes BASIC-80 Interpreter and operating logic for cassette level system, and built-in power-on diagnostic self-test.

☐ I/O

The 3270-PC 5271 System Unit includes 8 slots, like a PC/XT System Unit, but 4 to 7 slots are taken up by standard features. Standard (and presumably optional) feature slot locations are rigidly specified as follows.

Slot 1 (Long) • 3270 System Adapter • standard to all models.

Slot 2 (Long) • 1501013 64K-/256K-Byte Expansion Board • standard on Models 4 and 6; optional on Model 2.

Slot 3 (Long) • unassigned.

Slot 4 (Long) • 3270-PC Display Adapter; this adapter, which is standard to all models, can attach either a 5151 monochrome display or a 5272 color display, unlike other PC display adapters.

Slot 5 (Long) • 1602501 Fixed Disk Adapter • standard on Model 6, optional on Models 2 and 4.

Slot 6 (Long) • 1503780 Diskette Adapter • standard on all models.

Slot 7 (Short) • 1505200 Printer Adapter • standard on Models 4 and 6, optional on Model 2.

Slot 8 (Short) • Keyboard Adapter • standard on all models.

Thus Model 2 has 4 unassigned slots, Model 4 has 2 and Model 6 has 1. The primary candidate for the unassigned slot is a second 64K-/256K-byte Expansion Board, needed to expand memory beyond 512K bytes. However, IBM also allows attachment of an asynchronous adapter (RS-232C), allowing a second communications line or other RS-232C-compatible device. If one of these options is chosen, memory can only be expanded to 512K bytes on Model 5.

The expansion units supported on other PC systems are not currently supported on the 3270-PC. Disk and diskette adapters each support 2 drives but there is room for only 2 drives in the system unit. Therefore Model 6 systems with a fixed disk implemented do not permit the diskette subsystem to expand to 2 drives. Since fixed disk systems already have a standard diskette drive, a user who wants a second fixed disk would have to either use a third-party add-on drive, since the fixed-disk adapter for dual drives is already in the system, or would have to add IBM's (unsupported) expansion unit and test it for problems.

The I/O restrictions on the 3270-PC, particularly the lack of support of an expansion unit, may be a temporary problem. It is difficult to see why IBM would disallow the disk expansion since the disk and diskette adapters, which can each support 2 units, are already in the system.

☐ Communications

The primary communications controller for the 3270-PC is the 3274 communications system. The same functions are also supplied by the 4300 display/printer adapter. For a description of the 3274 control units and the communication services they render, see report **950-I048-3270.**

IBM also offers an asynchronous communications adapter for the 3270-PC. Although IBM doesn't mention it, there seems to be no apparent reason why this adapter couldn't be used to establish communication with independent hosts (i.e., other than those communicating with the 3274 control units) via leased lines on the switched network.

1502074 Asynchronous Communications Adapter • single-port, asynchronous, half-/full-duplex interface module provides RS-232C or 20-mA current-loop signal levels; software-selectable data rates of 50 to 9600 bps; 5 to 8 data bits; 1 start bit; 1 or 2 stop bits; odd, even, or no parity; optional system-interrupt generation • includes 25-pin, D-shell male connector and jumper block • requires system expansion slot:

$120 prch	NC/NC/NC/NC maint

1502067 Communications Adapter Cable:

75	NC/NC/NC/NC

☐ Disk

All 3270-PC models include a diskette drive and adapter as a standard feature. A fixed disk can be attached to any system, and is standard to the 5271-6 system package. See I/O for a discussion of expansion difficulties.

1503780 5.25-Inch Diskette Adapter • standard to all 3270-PC models; supports attachment of up to two 5.25-inch diskette drives • maximum of 1 adapter per system • requires system expansion slot number • manufactured by Tandon Corporation:

NC prch	NC/NC/NC/NC maint

1503800 5.25-Inch Dual-Sided Diskette Drive • 360K-byte, 5.25-inch, dual-sided, 180K bytes per side; 40 tracks per diskette; 48 tracks per inch; 6-millisecond track-to-track access time; 20,480-byte-per-second transfer rate; 300 revolutions per minute • maximum of 2 drives per 1503780 5.25-Inch Diskette Adapter providing there is space in System Unit • user installable in System Unit housing • requires 1503780 5.25-Inch Diskette Adapter • manufactured by Tandon Corporation:

529	58/47/38/33

1602500 Disk Drive • for PC 1 • 10M bytes of fixed disk storage using same physical dimensions and mounting as diskette drive • 90-millisecond average access; 512 bytes per sector, 17 sectors per track, 306 cylinders/tracks per surface; 3,600 rpm; can be installed in the 5161-1 Expansion Unit for the 5150 to expand disk capacity from 10M to 20M bytes; not available for 5161-2 • requires DOS 2 and 1602501 Adapter:

1,695	295/235/190/165

1602501 Fixed Disk Drive Adapter • provides buffering, error detection/correction, and DMA data transfer control for 1 or 2 1602500 10M-byte fixed disks • located in slot • requires 1 full feature slot, DOS 2 or 2.1:

695	NC/NC/NC/NC

☐ Terminals/Workstations

Standard 3270-PC Screen Management features permit the user to view all or part of a presentation space (a logical screen). Screens of up to 3,440 characters are supported although those larger than 2,000 will have to be scrolled. Operating software controls screen windows that can view portions or all of up to 10 logical screens; windows can be moved to anywhere on or off the screen. Different foreground and background colors can be defined for different host sessions providing they are not using extended data stream attributes. The 5151 display can be attached to the system but the 5272 is the display really tailored to

 ©1984 Data Decisions

IBM 3270 Personal Computer
5271-2, 5271-4 & 5271-6 Systems

the 5271 System Unit. Unlike other PCs both displays attach to the same (standard) adapter.

5272 Color Display • 14-inch, 8-color monitor; 720x350 pixels for graphics; 1920 characters for host and notepad sessions, 2000 characters for PC-DOS 2.0 or 2.1 sessions:

$995 prch	$90/$65/NA/NA maint

5151-001 IBM Monochrome Display • 11.5-inch diagonal, green phosphor screen; 25-row x 80-character display format; 7x9 dot-matrix character formation in 9x12 field • upper-/lowercase alphanumeric characters; special characters; line-graphic characters • character/field attributes include: underlining; blinking; normal/high intensity; reverse image; non-display • includes signal and power cables • requires standard 3270-PC Display Adapter:

345	44/35/28/25

5271-5730 Keyboard • typewriter-style, special alphanumeric keyboard • 3270 host keytop graphics printed in black; keytops unique to PC-DOS operations are printed in blue • adjustable slope • all noncontrol keys feature auto-repeat • keystroke record/play function to common key sequences; program function keys; ALT key permits access to all 256 ASCII and special characters • attached to System Unit via a coiled cable • included in packaged systems and available separately:

270	NA/NA/NA/NA

☐ Printers

The IBM 3270 Personal Computer supports an optional printer, attached via a separately available adapter, which is a standard feature on 5271-4 and 5271-6 System Units and optional on the 5271-2.

1505200 Printer Adapter • supports attachment of 5152-002 and compatible Graphics Printers; intended for use with systems configured with a Color/Graphics Monitor Adapter • requires system expansion slot number 7 (short slot):

$150 prch	NC/NC/NC/NC maint

5152-002 Graphics Printer • 80 cps; bidirectional printer allowing mixing of text and graphics • 9x9 dot matrix; 40, 66, 80, or 132 characters per line • requires 1505200 adapter:

595	63/50/40/35

1525612 Printer Cable • 6-foot cable connects 5152-002 Graphics Printer to 1505200 Printer Adapter or 1504900 Monochrome Display and Printer Adapter:

55	NC/NC/NC/NC

5182-001 PC Color Printer • 200-cps bidirectional dot matrix printer • 132 columns • 4 print modes include draft (200 cps), text (110 cps), APA graphics, and near-letter-quality (35 cps); 4-band ribbon mixable to produce 8 colors • 6K-byte print buffer fixed proportional spacing, 10, 12, 17.1 nominal fixed pitch with double width at each pitch; 13.5-inch print line; 3 resident fonts • tractor feed and manual single-sheet feed; up to 4 part forms • requires parallel printer adapter on PCjr; requires standard printer signal cable; Printer Adapter, or on Monochrome Display and Printer Adapter software compatible with the 5152-002 graphics printer:

1,995	565/455/365/365

• **END**

©1984 Data Decisions

IBM 3705-II & 3705-80 Communication Controllers

3705-II Models E, F, G, H, J, K & L and 3705-80 Models M81, M82 & M83

■ PROFILE

Function • programmable local/remote communications controllers.

Associated Systems/Networks • IBM S/370, 303X, 3081, and 4300, single-/multiprocessor SNA networks • S/360 Model 40 upwards in 270X emulation mode only • X.25 gateway from SNA to other networks • supports up to 16 full-duplex 9600-bps lines (3705-80) or 352 half-duplex 9600-bps lines (3705-II) • maximum line rate of 230K bps • supports up to 2 (3705-80) or 4 (3705-II) channel-attached hosts simultaneously; other hosts attached through remote 3705s.

Operating Systems • NCP or EP generated and loaded from host running under DOS/VS and/or OS/VS environment; ACF/NCP/VS can be shared by up to 8 hosts: 4 connected through channels and 4 through communications lines no more than 1 SDLC data link away • current NCP version is ACF/NCP Version 3 for 3705.

Program Development/Languages • via SSPs at host facilities; SSPs provide control program macro language, assembler, and load/dump utilities.

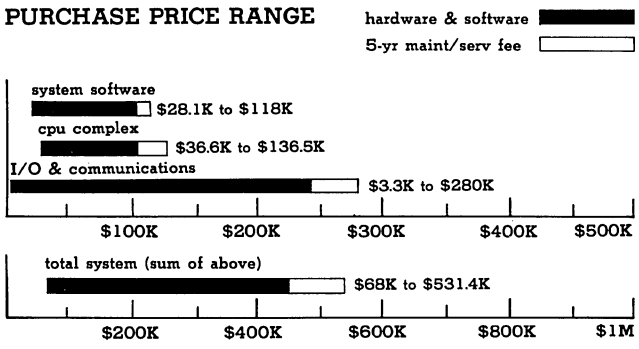
Processor • 32K- to 512K-byte memory; no disk support.

First Delivery • 1973 (first 3705); 1976 (3705-II Models E through H); 1979 (3705-II Models J through L); 1981 (3705-80).

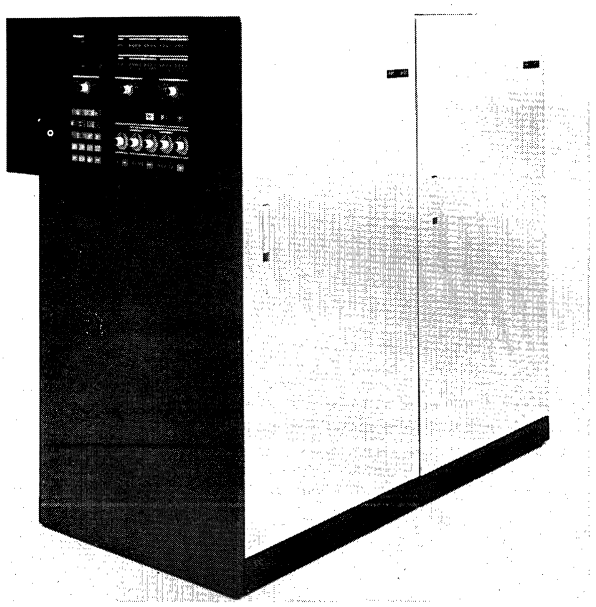
Systems Delivered • over 56,000; over 20,000 in U.S.

Comparable Systems • NCR/COMTEN 3600 Series, and Amdahl 4705; Memorex 1380, Computer Communications CC Series and other independent front-end manufacturer models offer 270X/370X emulations with BSC or BSC/SNA/SDLC capability as replacements for IBM 3705 controllers running in Emulation Program (EP) mode • larger number of front-end models offer communications control capability in nonemulation or other IBM terminal emulation modes • Amdahl uses IBM software; NCR Comten uses its own software.

PURCHASE PRICE RANGE



IBM 3705 PURCHASE PRICING bar graphs illustrate price ranges for small to large systems, with solid bars reflecting software/hardware purchase pricing, and open bars reflecting 5-year service/maintenance fees associated with large system • **SMALL SYSTEM** is based on IBM 3705-81 **packaged system** (includes NCP/VS and EP systems software, CPU, 256K-byte memory, and 4 RS-232C/V.24 communications interfaces) and the following option: ACF/NCP 3.0 and 1551 Type 1 channel **I/O & communications** adapter • **LARGE SYSTEM** is based on IBM 3705 Model L4 **packaged system** (includes CPU, 512K-byte memory, and 4 frames) and the following options: ACF/NCP/VS V3.0, SSP 2.2, X.25 NPSI 1.3.1, EP/3705, NTO 2.1, Non-SNA Interconnection and other **systems software**; and **I/O & communications** hardware including: two 1542 Type 1, one 1543 Type 3, and one 1544 Type 4 channel adapters; two 1642 Type 2, one 1643 Type 3, and one 1644 Type 4 scanners, 256 2400-bps lines, and one 240.6K-bps line.



Vendor • International Business Machines (IBM) Corporation, Information Systems Group • National Accounts Division; 1133 Westchester Avenue, White Plains, NY 10604; 914-696-1900 • National Marketing Division; 4111 Northside Parkway, Atlanta, GA 30327; 404-238-2000.

Canadian Headquarters • IBM Canada Ltd; 3500 Steeles Avenue East, Markham, ON L3R 2Z1 • 416-474-2111 • offices located in other cities in Canada.

Distribution • worldwide via local IBM sales/service offices.

GSA Schedule • listed.

■ ANALYSIS

As of September 28, 1983, the IBM 3705 and 3706 were placed in limited new production. The operating system software has been frozen at ACF/NCP Version 3 for the 3705. All new releases will be for the IBM 3725 only.

The IBM 3705 software-programmable controllers relieve host processors of many data communications and networking tasks. Functioning under a Network Control Program (NCP) generated on and loaded from a 370, 3030, 4300, or 3080 series compatible host, the 3705 assumes such communications overhead functions as polling/addressing, link control, line error recovery, dynamic buffer control, character code translation, line control, character recognition, line timeout, character assembly/disassembly, and error checking/recovery. An Emulation Control Program (EP)

 ©1985 Data Decisions

IBM 3705-II & 3705-80 Communication Controllers

3705-II Models E, F, G, H, J, K & L and 3705-80 Models M81, M82 & M83

also allows 3705 to operate as replacement for hardwired 270X series adapters/controllers.

The 3705 controller, running under a partially unbundled combination of one of the ACF/NCP/VS licensed program products with the appropriate NCP/VS Corequisite SCP, assumes more advanced networking functions associated with other IBM ACF products and SNA architecture. In this environment, the 3705 is the keystone of the network, governing access to/from multiple hosts. Cross-domain message routing allows data flow between adjacent 3705s as well as from stations within or outside the domain. Network recovery and resource availability are also enhanced under the auspices of 3705s functioning in an ACF mode.

The 3705 supports attachment of up to 16 full-duplex (3705-80) or 352 half-duplex (3705-II) 9600-bps lines, with similar lower limits for higher data rates. The 3705 supports simultaneous operations from up to 2 (3705-80) or 4 (3705-II) channel-attached hosts, has maximum line rate of 56K bps (3705-80) or 240K bps (3705-II), can operate in a remote line concentrator as well as local host-attached mode, can handle both 270X emulation and regular network control program simultaneously, and has ACF compatibility with IBM's SNA architecture.

With the X.25 Packet Switching Interface (NPSI), the 3705 provides a gateway to X.25 networks from SNA networks. The latest release allows SNA networks to be interconnected through X.25 networks. The interface also supports the X.21 device connect protocol as well as X.29 and X.28 protocols.

Programs for the 3705 are generated on the S/370-compatible host using a macro language to specify system parameters: configuration, number of connections to hosts, number of hosts, type of lines used, number of lines, speed of lines, and so on. The same source code generates the access method (VTAM or TCAM) in host so the 2 programs work together compatibly. In an SNA network, the 3705 functions as an intermediate node and all host nodes must connect to it to gain access to the network. The 3705 Network Control Program (NCP) obtains its directions from the access method (VTAM or TCAM) in the host. Once operations are initiated by the access method, the 3705 can operate independently of the host. The IBM 3725 essentially replaces the 3705. The 3725 is not software or hardware compatible with the 3705, but IBM has generated versions of NCP, EP, SSP, X.25, NPSI, VTAM, and TCAM to bridge the 3705 and 3725 environments. This software allows 3705s and 3725s to coreside on SNA networks.

IBM's freezing of ACF/NCP at Version 3 for the 3705 is not surprising; the 3705-II has been available since 1976 and the 3705-80 since 1981. It has already outlived many predictions of its demise. The phase-out period will be long and slow because so many 3705 systems are installed and they are reliable.

☐ Ease of Use Features

Programs for the 3705 are generated on the S/370-compatible host using a macro language to specify system parameters: configuration, number of connections to hosts, number of hosts, type of lines used, number of lines, speed of lines, and so on. The same source code generates the access method (VTAM or TCAM) in host so the 2 programs work together compatibly. The 3705-80 consists of preconfigured models with few selectable features, thus they are easy to configure.

☐ Modes of Operation

The 3705 can emulate the operation of the hardwired IBM 270X front-end controllers. It can operate as a local/remote front end to 1 or more S/370-compatible hosts. It can perform both functions concurrently. In an SNA network, the 3705 functions as an intermediate node and all host nodes must connect to it to gain access to the network. The 3705 Network Control Program (NCP) obtains its directions from the access method (VTAM or TCAM) in the host. Once operations are initiated by the access method, the 3705 can operate independently of the host.

☐ Strengths

The 3705 has served a central role in IBM's approach to networking and distributed processing via SNA and BSC/SDLC protocols; this status plus a full array of controller sizes, I/O and line modules, and control program support allow users to start small and eventually migrate upwards to large, more advanced, ACF-accessed multiprocessor networks with a high degree of hardware/software compatibility.

The mantle has now been passed to the 3725, one of the 3705's main strengths was its reliability, which the 3725 will find hard to beat. The 3705, however, can reside compatibly on SNA networks with the 3725.

☐ Limitations

The 3705 has been on the market since 1973 and has finally been replaced by the 3725 with substantially improved price/performance and flexibility. The 3705 is hard to configure with many separately priced parts to be assembled. The relative simplicity of the 3725 is a great relief to IBM SNA network users.

The 3705 has limited memory, no disk storage, no local program development, and no I/O devices; limitations that made it a worthy candidate for replacement.

■ SOFTWARE

☐ Terms & Support

Terms • terms vary depending on whether the package is designated as a System Control Program (SCP), Program Product (PP), Field Developed Program (FDP), Installed User Program (IUP), or Programming Request For Price Quotation (PRPQ) • SCPs are bundled in the system and incur no license fee • most PPs incur a perpetual monthly license fee for each copy; some PPs can also have a lower Distributed System License Option (DSLO) for multiple copies; recent PPs also incur an initial license charge followed by the perpetual monthly license fee • most FDPs, IUPs, and PRPQs have a monthly license with a definite time limit (usually 12 or 24 months) after which no additional charges are levied; IBM occasionally supplies "standard" pricing on PRPQs, but most frequently makes individual quotes on inquiry only; a small number of programs in all categories can be purchased for a one-time charge; a small number of recently announced programs require an initial fee in addition to the monthly license fee.

Support • support/maintenance policies have been in transition for a number of years, and a variety of pricing/support arrangements are in effect, particularly for PP software • the support category A (central and local field engineering service), B (central service), or C (support withdrawn) for older PPs described the type of service bundled in the license fee at no extra charge; the only other alternative was local service at an additional charge • some older PP software licensing includes central service plus either local service provided by IBM Field Engineering (LS) or local assistance provided by IBM systems engineers (LA) until a specified date • since 1979, access to a central database containing information on a large percentage of IBM's installed base has been included for the currently supported PP releases at no extra charge, but local program support incurred a monthly charge (MLPSC); in 1980, an additional lower fee (MALPSC) was charged for identical programs at the same site or at those distributed sites which could transmit programs to a central site for local service; in 1981, the price structure was revised to combine the 2 fees into a monthly multiple licensed program support charge (MMLPSC) effective on new orders, but the MALPSC was retained until December 1982 for existing customers • FDPs and IUPs are provided on an as-is basis without warranty, but certain programs designated extended support (ES) are provided with central service, usually at no extra charge; FDPs and IUPs are developed by IBM in conjunction with a particular installation; FDPs belong to IBM, whereas IUPs belong to the coauthor/user, but are licensed through IBM • SCPs are divided into 2 classes; Class 1 includes most major operating systems as well as NCP/VS, NCP/VS corequisite SCP, and EP SCPs; Class 1 is divided into 3 categories: MPSC/MAPSC/MMPSC (A/B/C); these correspond to MLPSC/MALPSC/MMLPSC charges, respectively; all SCP charges depend on the processor model; the 3705 SCPs all fall into Class 1 category C.

 ©1985 Data Decisions

IBM 3705-II & 3705-80 Communication Controllers

3705-II Models E, F, G, H, J, K & L and 3705-80 Models M81, M82 & M83

3705 SCP Support • for NCP/VS Release 5, NCP/VS Corequisite SCP and/or EP:

NC/NC initl	NC/NC mo	$25/$40 serv

☐ Operating Systems

The operating system residing in 3705 controllers governs data transfers between stations and hosts in the communications network. It is generated at the host using IBM-supplied macro language, assembler, and utility software. The operating system is loaded from the host, and executed in response to host commands. It takes 2 forms; Network Control Program (NCP) for full programmable front-end processing tasks, and Emulation Program (EP) for emulating IBM 2701/2702/2703 (270X) hardwired controllers. EP and NCP/VS can both be obtained as System Control Programs (SCPs), which are in the public domain and hence do not incur license fees. If Advanced Communication Function (ACF) licensed program products (PPs) associated specifically with NCP/VS are added to the system, then a special version of NCP/VS Release 5.0, called ACF/NCP corequisite SCP, must be used. This combination SCP and PP is the actively developing element of 3705 and SNA control software; developments in the EP SCP operating mode are few and far between. The non-SNA interconnection facility is a step in the direction of eliminating EP, PEP, and NTO.

If local program support is required for an SCP, a single fee is charged based on the processor rather than the number of SCPs.

☐ Communications/Networks

NCP Software

NCP/VS Release 5 (R5) • manages the physical communications network: includes functions associated with conventional transmission control units such as control character recognition, line time-out control, error checking, and character assembly/disassembly; such functions are usually performed by NCP/VS software rather than 3705-II hardware • NCP/VS also assumes most of the communications line control from host access method; such functions include multipoint line polling/addressing, switched network dial/answer, character/bit/buffer interrupt control, control character insert/delete, asynchronous/BSC character code translation into/out of EBCDIC, dynamic buffering, local/remote controller block/message transmission control, error recording/diagnostics, error recovery/diagnostics, and certain other channel/terminal access/delay functions • NCP/VS also incorporates certain dynamic control functions such as line activate/deactivate, line status request, ID/polling/addressing character, replacement, multipoint poll/address order change, and rescheduling • concurrent NCP and EP mode operation via Partitioned Emulation Programming (PEP); for 3705 operation as remote communications concentrator; and for speed selection involving lines equipped with IBM modems • SDLC/BSC path enhancement provides SNA application-driven 2-way path between host positive credit session of 3651 retail system and specific BSC device via 3705 • requires 3705 with 48K-byte memory, 1541 Type 1 channel adapter, and 1642 Type 2 communications scanner • program number is 5744-BA2 for OS/VS and 5747-AJ2 for DOS/VS environments • nonlicensed bundled System Control Program (SCP).

ACF/NCP/VS Corequisite NCP/SSP SCP • version of NCP/VS Release 5 and its corresponding SSPs, which are modified to operate in conjunction with ACF/NCP/VS licensed program products; no license fee is incurred, but local program support for the SCP component entails a fee based on the machine model (see Support); local program support for the licensed program product (PP) component is associated with the program product like any other PP (see 5735-XX1).

5735-XX1 ACF/NCP/VS Version 1, Release 1 (V1, R1) • Advanced Communications Function (ACF)/NCP/VS V1 R1 operates in conjunction with host ACF/TCAM/VS and/or ACF/VTAM/VS access methods to extend NCP/VS capability to SNA single or multiprocessor networks; compatible with non-ACF TCAM/VTAM application programs • multiple system networking allowing cross-system message routing independent of host control via 3705(s) after session is established; distributed processing and enhanced resource sharing between multiple host or host-subsystem networks; and consolidation of multisystem communications management, user-written transaction routing and message switching applications in single controller • single system networking allows the sharing of 3705 facilities by mixture of host access methods; and minimizing data congestion and buffer depletion in host or 3705 by control of message flow • supports up to 2 (3705-80)/4 (3705-II) host channel adapters allowing concurrent communications with up to 2/4 access methods in 1 or more attached hosts • supports 1544 Type 4 channel adapter 3705 cycle steal operation in conjunction with host • supports full-duplex 56K-bps line set operations • supports cross-system message routing for direct communications between locally attached 3705s and ACF/NCP/VS via half-/full-duplex SDLC lines; message routing between SDLC device and destination ACF/TCAM or ACF/VTAM processor independent of host; and direct message routing for adjacent ACF/NCP/VS programs without host intervention • supports cross-system message routing between async/BSC devices and destination processor independent of host • maintains sessions on nonswitched SDLC lines and cross-system routing during host system failure • supports remote or local 3705 to be reconfigured as remote controller under control of different host system • requires ACF/NCP/VS corequisite SCP, 5735-XX3 SSP ACF/NCP/VS, and 3705.

5735-XX1 ACF/NCP/VS V1, R2/R2.1 • R2 offers enhanced SDLC data link and terminal test features, dynamic reconfiguration capability for SNA/SDLC nonswitched devices for greater networking flexibility • R2.1 supports LPDA (Link Problem Determination Aid), 230.4K-bps operations, and other enhancements supported under DOS/VS R34, DOS/VSE, OS/VS1 R6.7/7.0, and MVS R3.7/R3.8; operates with TCAM 10.0, VTAM 2.0 (OS/VS1 and OS/MVS), ACF/TCAM (V1, V2 R1/R2/R3), ACF/VTAM (R1/R2/R3) • each includes functions of previous ACF/NCP/VS releases • supports CCITT X.25 Packet Switching Interface Releases 1 and 2 • requires ACF/NCP/VS corequisite SCP, 5735-XX3 SSP ACF/NCP/VS, and 3705-II with 96K-byte memory.

5735-XX1 ACF/NCP/VS V1, R3 • offers enhancements such as support of parallel SDLC links between adjacent 3705s, logical groupings of links between adjacent network nodes, multiple session-selectable transmission priority levels, and certain other networking, data flow, and verification/error features • supported under DOS/VS R34, DOS/VSE, OS/VS1 R7.0, and MVS R3.8; operates with ACF/TCAM (V1, V2 R1/R2/R3), ACF/VTAM (R1/R2/R3) • supports functions of previous ACF/NCP/VS releases, and NCP/VS 5.0 except for SDLC/BSC 2-way path function • supports CCITT X.25 Packet Switching Interface Release 3 • both require ACF/NCP/VS corequisite SCP, and 5735-XX3 SSP ACF/NCP/VS program product; R2 requires 3705 processor with 96K-byte memory, while R2.1 requires 3705 with 128K-byte memory:

$1,190/$893 initl	$213/$160 mo	$55/$88 serv

5735-XX9 ACF/NCP/VS Version 2 Release 1 (V2, R1) for 3705 • compatible with 5735-XX9 for 3725; includes the capabilities of V1 R3 plus expanded trace facilities and the capability of loading PEP load modules using data links • trace facilities include a generalized path information unit trace; support for the session trace for NLDM licensed program, enhanced address trace and a dispatcher trace • a Network Performance Analyzer function is also included • this is generated using a corresponding Version 2 of the ACF/SSP (5735-XXA) • designed to operate with VSE/AF R3, OS/VS1 R7, MVS R3.8, MVS/SP R13.1; will operate with MVS/XA in 24-bit addressing mode • supports and can communicate with ACF/SSP V.2, ACF/TCAM V.2 R3 and 4, ACF/VTAM V1 R3 and V2, EREP NPA-Host R1.3, NPDA V2, and NLDM host and with

INITL: first figure is initial charge for primary system; second figure is for distributed system (DSLO). MO: first figure is monthly license charge for primary system; second figure is for distributed system (DSLO). SERV: first figure is monthly service charge for a single system (MLPSC); second figure is for multiple systems (MMLPSC). NA: not applicable. NC: no charge. Prices effective as of June 1, 1985.

 ©1985 Data Decisions

IBM 3705-II & 3705-80 Communication Controllers

3705-II Models E, F, G, H, J, K & L and 3705-80 Models M81, M82 & M83

ACF/NCP V1 R21, R3, and V2, EP for 3705 and 3725, NTOR2, X.25 NCP PSI R3.1, and NRF on other 3705s or 3725s:

1,190/893	238/179	55/88

5667-124 ACF/NCP Version 3 • designed for use with hosts running MVS/370 or MVS/XA compatibility mode and for both the IBM 3705 and 3725 • has no designated system control programming corequisite • supports capability for independent SNA networks to communicate through SNA Network Interconnection in conjunction with ACF/VTAM V2R2 running on host; allows forced deactivation of SNA resources and non-SNA lines; extends support to reporting of received signal level execution of and LPDA (Link Problem Determination Aid) commands on data multiplexed links and tail-circuit attached links for IBM modems (3863, 3864, 3865, and 3868); improves problem determination abilities through tracing the path of a session and mapping physical addresses to logical names in conjunction with Network Logical Data Management (NLDM) Release 2 • all enhancements that were previously supported for the 3725 in Version 2 are now provided for 3705 as well as 3725 in Version 3: reduced SYSGEN time due to removal of conditional assemblies and key control blocks can be extended above 64K boundary • for 3725 only, supports functional hardware improvements including additional storage protection; 2M bytes of memory; links across an intermediate node which can send up to 127 blocks of data before requiring an acknowledgement; port swapping; and enhanced start/stop facilities • SSCP in ACF/VTAM V2R2 and ACF/NCP V3 can operate as a gateway SSCP and gateway NCP to manage and control sessions that cross SNA networks, providing SNA Network Interconnections (SNI); 2 end points in different networks can be logically interconnected through the gateway NCP; each network preserves its own characteristics for naming, control, and security; interconnected networks can partition the 16-bit differently so that a 15-subarea network can be interconnected with a 64-subarea network, addresses in one network are transformed into corresponding addresses of the other network; through alias name translation function of the Network Communication Control Facility (NCCF) Version 2 each network can have its own name structure • BSC 3270 terminals can conduct cross-network sessions; networks can be interconnected with multiple gateway NCPs; a gateway NCP can interconnect up to 255 networks and can connect to any pair of networks; all cross domain LU-LU sessions are supported across networks • a gateway NCP can be owned by up to 8 SSCPs at a time; the individual SSCPs may or may not be gateway SSCPs • the gateway NCP can also perform other NCP functions consistent with available storage and performance capabilities • according to IBM statement of intention, ACF/NCP Version 3 is last NCP release for 3705, thus no further functional enhancements for the 3705 NCP are planned; also no functional enhancements are planned to ACF/NCP for OS/VS1; IBM will continue to enhance ACF/NCP for the VSE environment and requires ACF/SSP V2R2 (5735-XXA) on host system for generation of ACF/NCP V3; operates with MVS/SP V1 and MVS/XA for extended architecture processors (24-bit mode); use of partitioned emulation programming with ACF/NCP V3 requires EP • ACF/NCP V3 supports ACF/TCAM V2R4, ACF/VTAM V1R3 (MVS only), ACF/VTAM V2R1 (MVS only), and ACF/VTAM V2R2 at the functional level of the access method; ACF/NCP V1R2.1, V1R3, V2 (3705 and 3725) and V3 can communicate with ACF/NCP V3; ACF/NCP V3 is compatible with ACF/SSP V2R2, EREP MVS, NPA-Host Program offering (5798-CZR), NPDAV2 or V3, NCCF R2 or V2, and NLDMR1 or R2 running on the host; ACF/NCP V3 is compatible with EP, NTO R2.1, NRF R1.5, X.25 NPSI (fourth quarter 1984), and non-SNA interconnection (first quarter 1985 for IBM 3725) running on the 3705/3725 • users may continue to order ACF/NCP V2, V1R3, and V1R2.1 for 3705 and ACF/NCP V2 for 3725 after ACF/NCP V3 is available:

2,550/2,310	425/385	148/237

PEP Extension • Partitioned Emulation Program (PEP) extension of NCP/VS or ACF/NCP/VS allows operation in Network Control mode as well as in 2701/2702/2703 Emulation mode; supports concurrent operation of emulation-type applications as well as new or converted NCP/VS or ACF/NCP/VS programs • supports features, terminals and attachments of EP/VS or NCP/VS partition; also provides 2-channel NCP/VS support for multiprocessor systems via 1541 Type 1 and 1543 Type 3 channel adapters; NCP/VS support is for virtual systems only • under ACF/NCP/VS, PEP can operate on local 3705s, but terminals under EP/VS cannot utilize ACF network facilities; PEP enhances 2-channel 3705 operation; only first 2 channel adapters can share EP functions of PEP • bundled into NCP VS or ACF/NCP/VS corequisite SCPs; no license charge; requires EP software.

EP Software

Emulator Program (EP) • allows local-attached 3705/3725 controllers to function as IBM 2701 Data Adapter Unit, IBM 2702 Transmission Control Unit, and/or IBM 2703 Transmission Control Unit • includes IBM Type I access methods that support 2701/2702/2703 as well as IBM Type II and III or user-written programs that interface with 2701/2702/2703 • multiple subchannel line access (MSLA) feature in conjunction with 1544 Type 4 channel adapters on 3705 allows 2 adapters to be attached to same/different hosts; EP can switch line control from 1 access method to another within the same/different hosts, allowing 2 access methods connection to same line over separate subchannels; allows load balancing of lines between 2 hosts during busy periods, backup in case host, access method or channel fails, and alternate line sharing for 2 access methods • 3705 EP operation with 2 1544 Type 4 adapters supports up to 352 lines at 45.5 to 50K bps • runs on any 3705; supports up to 2 1541 Type 1 and/or 1544 Type 2 channel adapters, and BSC 1643 Type 3 scanner operation • 3705-80 EP with 2 1544 Type 4 adapters supports up to 16 lines at 9500 bps; 1 high-speed attachment supports 1 full-duplex or 2 half-duplex 56K-bps line(s).

5735-XXB Emulation Program (EP) • for IBM 3705 and 3725 communication controllers for use with host processors in MVS/370 and MVX/XA compatibility mode environment • available for IBM 3705 March 1984 and for IBM 3725 June 1984:

$1,365/$1,025 initl	$256/$192 mo	$40/$64 serv

☐ Program Development/Languages

5735-XX3 System Support Programs (SSPs) • generate NCP and EP, and their various VS and ACF versions • SSPs include support programs for generating the control program, an assembler, and loader and dump utilities; program generation and the assembler are executed on the S/370-compatible host processor, with utilities divided into portions that run on the host and the 3705-II • for control program generation, IBM supplies a generation language for specifying network configuration and program options, and a macro library from which source statements are expanded • the assembler operates on machine instructions written in controller assembler language, on macro instructions, and on assembler instructions; machine and macro instructions are translated into object code, with assembler instructions performing certain operations during assembly process • loader and dump utilities aid in debugging programs and in forwarding program modules to the communications controller via local channel attachment • DOS/VS SSPs require 64K bytes of virtual storage; OS/VS SSPs require 192K bytes of virtual storage • non-ACF versions are bundled into SCPs.

5735-XX3 SSP ACF/NCP/VS R2.1 • a program product that provides SSP facilities to support ACF/NCP/VS R2.1 and R3 control programs:

$363/$272 initl	$65/$49 mo	$22/$35 serv

5735-XXA ACF/SSP V2 R1.1 • provides generation and utility functions for ACF/NCP V2 on 3705, ACF/NCP V2 on 3725, EP on 3705 or 3725 • runs on host system under VSE/AF R3, OS/VS1 R7, MVS/370 R3.8, and MVS/XA; requires appropriate version of ACF/TCAM or ACF/VTAM; runs as nonsystem task under operating system:

462/347	84/63	22/35

5735-XXA ACF/SSP V2R2 • runs on S/370-compatible host with MVS/370 (MVS/SP R1) and MVS/XA (MVS/SP V2) in compatibility mode • provides generation and utility functions for ACF/NCP V3 and its partitioned emulation programming (PEP) extension for the IBM 3705 and IBM 3725 (5667-124) and for the

 ©1985 Data Decisions

IBM 3705-II & 3705-80 Communication Controllers

3705-II Models E, F, G, H, J, K & L and 3705-80 Models M81, M82 & M83

Emulation Program (EP) for IBM Communication Controllers (5735-XXB) • provides utility and load functions for ACF/NCP V2 but will not generate ACF/NCP V2; ACF/SSP V2 R1.1 will remain available to support ACF/NCP V2 and Emulation Program (5747-CH2) for 3705 and Emulation Program R1 (5735-XXB) for 3725 • enhances the ACF trace analysis program (ACF/TAP) • PEP user requires 5735-XXB Emulation Program • available January 1984:

462/347	84/63	22/35

☐ Other Facilities

5668-951 Non-SNA Interconnection • extends networking facilities of ACF/NCP V2 for 3705/3725 to selected RJE devices and Network Job Entry (NJE) subsystems; allows facilities to transport BSC data through an SNA network, sharing SDLC links • supports point-to-point leased line operation, EBCDIC or ASCII code (dependent on subsystem support), and the following BSC RJE terminals: 3780 Data Communication Terminal; 3776 Model 1 Communication Terminal; 3776 Model 2 Communication Terminal; 3777 Model 1 Communication Terminal; and IBM terminals supporting the IBM BSC multileaving protocol, IBM 3777 Model 2; IBM System/360 Model 20, Submodel 5; System/38 MRJE; System/34 MRJE; System/370, 30XX, or 43XX processors with a Workstation Package • supports the following BSC NJE subsystems: MVS/SP-JES2 Version 1 Release 3; MVS/SP-JES2 Version 2; MVS/SP-JES3 Version 1 Release 3; MVS/SP-JES3 Version 2; VM/RSCS Networking Release 2 and Release 3; and VSE/POWER Version 2 Networking Support • provides an interface to problem determination aids available in ACF/NCP V2 • supports SNA problem determination facilities in lieu of EP diagnostic aids: NCP address, generalized PIU, and Transmission Group line traces; NPDA; LPDA; NPA for logical and physical unit statistics; ACF/NCP dump utilities; ACF/TAP; scanner interface trace (SIT) for 3725; and NLDM session trace between BSC facility and VTAM SSCP • can be used in lieu of PEP or EP for BSC RJE terminals or BSC subsystem host-to-host facilities • can be used with NTO or NRF and can coexist with PEP but non-SNA Interconnection-controlled BSC lines cannot be alternated between non-SNA Interconnection and EP or NTO BSC operation • available for IBM 3705 September 1983 and for IBM 3725 fourth quarter 1984 (for MVS/370, MVS/XA, and VSE/AF systems):

$1,605/$1,440 initl	$465/$419 mo	$40/$64 serv

5668-981 X.25 NCP Packet Switching Interface (NPSI) • provides gateway into X.25 packet-switched networks; conforms to CCITT X.25 Level 1 recommendation offered in Releases 1, 2, and 3 • requires CS2 or CS3 communications scanner on 3705 and ACF/NCP/VS program product with corequisite SCP software.

X.25 NPSI R1 • provides basic link to X.25 networks and features maximum packet length of 4092 characters and "Modulo 8" package that requires acknowledgement by receiving node after 8 packets before transmission node will continue sending data • functional equivalent to World Trade Packet Switching attachment • supports protocol conversion for non-SNA devices; cryptographic subsystem/access method products; SNA communication to selected SNA devices via X.25 networks and Network Interface Adapter (NIA); CICS/VS, IMS/VS, TSO, and NCCF products; and coresidence on 3705 with NTO (Network Terminal Option) • runs under ACF/NCP/VS R2.1 and corequisite SCP, with ACF/TCAM V2 R2/3 OS/VS or DOS/VSE.

5668-981 X.25 NPSI R2 • supports subset of CCITT X.29 to allow communication with start/stop, TTY 33/35, and other terminals conforming to CCITT X.28 • user-written host application can manage X.25 control functions • at application level, user writes own packet assembly/disassembly (PAD) support for BSC or other protocol • supports Modulo 8 and 128 levels of packet numbering • supports X.25 diagnostic packet • runs under same software as Release 1.

5668-981 X.25 NPSI R3 • allows interconnection of SNA nodes through X.25 networks • supports CCITT X.21 nonswitched interface adapter as physical attachment to X.25 network • runs under ACF/NCP/VS R3 with ACF/TCAM V2 R3 (OS/VS only) and/or ACF/VTAM R3 under OS/VS or DOS/VSE, with appropriate corequisite SCP, processor, and memory features.

5668-981 X.25 NPSI R3.1 • functionally equivalent to NPSI R4 which supports IBM 3725 only except R4 link access support is LAPB • provides same features as R3 and adds NPDA support and coexistence with 3725 licensed programs • supports line speeds from 1200 to 56K bps, IBM cryptographic subsystem/access methods products, host application management of X.25 control functions, and selected user facilities:

700/525	245/184	33/54

5668-963 Network Routing Facility (NRF) • designed to provide ACF/NCP/VS users with a message routing facility; resides in communication processor and routes messages between various devices without using host facilities.

5668-963 NRF R1 • designed for use with IBM 3705; limited to routing among up to 255 logical units (LUs).

5668-963 Network Routing Facilities (NRF) R1.5 • required for operating with ACF/NCP V3; supports both IBM 3705 and 3725; removes restriction of a maximum of 255 LUs (logical units) supported by NRF R1; can define 255 PUs (physical units) per line and 255 LUs per PU; can route to/from CICS/VS host application using IBM 3650 Pipeline Logical Unit (LU); can also route between terminals in different subareas, i.e., attached to different NCPs • allows forced deactivation of SNA resources being routed through NRF R1.5; reduces buffer-size requirement from 92 to 72 bytes to match ACF/NCP V3 minimum buffer size; can provide information on virtual routes (VRs), explicit routes (ERs) and subareas between LUs to the NLDM R2 • requires ACF/NCP V3, NTO R2.1, if routing messages to 3780 BSC devices, and ACF/VTAM V2R2 if NLDM R2 is required • NRF R1 is upward compatible with NRF R1.5 except a new NRF PU macro must be coded (needed to remove 255 LUs restriction) • requires about 30K bytes of storage on 3705/3725 for static control blocks and modules; additional storage required for each LU, routing related tables, user-exit routines and control, and NTO R2.1 when used • available March 1984 for 3705 and June 1984 for 3725:

3,205/2,405	1,070/803	226/362

5735-XX7 Network Terminal Option (NTO) R1 • extends ACF/NCP V1 R2 and above to allow non-SNA terminals access to SNA through record mode application program interface in ACF/VTAM R2 and R3 and ACF/TCAM V2 R3 by appearing to be SDLC 3767 communications terminals • support 2740 Model 1 and 2741 switched or nonswitched TWX Model 33/35 switched, and WTTY nonswitched terminals.

5735-XX7 NTO R2 • required to run ACF/NCP V2 which supports 3705 and 3725:

600/450	188/141	16/25

5735-XX7 NTO R2.1 • for the IBM 3705 and IBM 3725; required to operate in conjunction with ACF/NCP V3 • includes all features of NTO R2 and provides availability enhancements; allows forced deactivation of non-SNA lines attached to non-SNA terminals supported by R2.1; all ABENDs in NTO R2.1 have unique identifications • IBM plans no functional enhancements to NTO for OS/VS1 but does plan to enhance NTO in the VSE environment • requires ACF/NCP V3 for IBM 3705 or 3725, ACF/SSP V2R2 and appropriate access methods and operating systems on host systems; requires 15 additional bytes of memory over NTO R2 for each NTO terminal • available March 1984 for IBM 3705 and June 1984 for IBM 3725:

600/450	188/141	11/18

5798-CZT Network Program Analyzer (NPA) • collects network operating data to identify performance problems, to tune communications networks, and to gauge unused capacity • consists of NPA host and NPS controller; NPA controller modifies NCP to collect data on message traffic, error counts, line usage, and 3705 utilization.

NPA Controller • FDP product:

NA/NA	44/NA	NA/NA

5798-CHZ 370X Trace Editor • enhances 3705 dynamic trace output for EP 2.2/2.3 users; controls the amount and type of output, and reformats data into more readable display • output in symbolic form representing CPU-to-3705-to-terminal/line

 ©1985 Data Decisions

IBM 3705-II & 3705-80 Communication Controllers

3705-II Models E, F, G, H, J, K & L and 3705-80 Models M81, M82 & M83

connection • FDP product; 12-month period monthly license charge:

55/NA	NC/NA	NA/NA

5799-BAF 3705 PEP Extended • enhanced PEP extension features for 3705 • RPQ available on continuous monthly license charge:

NA/NA	NA/96	NA/NA

■ HARDWARE

☐ Terms & Support

Terms • the 3705 Communications Controllers are available on a purchase, 30-day rental, or 2-year lease basis • IBM allows up to 60% of first-year rental/lease charges to be accrued towards purchase • lease plan cancellation charge is smaller of lease fees for 5-month period or for 25% of remaining term; IBM guarantees no more than 5% per year rate increase maximum for models under lease contracts • lease plan allows for unlimited use; rental plan subject to extra use charge of 1/176th of 10% of the monthly rental fee for each hour in excess of 176 hours per month.

Support • 3705 marketed and supported through nationwide network of local IBM offices • maintenance bundled into rental and lease charges, and extra for purchased units; basic monthly maintenance charges cited in text for purchased equipment only, with availability on 9 consecutive hours, 7:00 AM to 6:00 PM, Monday through Friday basis; extended service for weekends or before/after standard hours at premiums over basic rate cited; full, 24-hour, 7-day service adds 47% premium to fees.

☐ Overview

IBM 3705 controllers are programmable, communications processors, software compatible with earlier 3704 and 3705-I models, designed to assume some communications overhead of a host processor in addition to performing control and message processing functions associated with a transmission control unit (TCU). As such, the 3705 relieves the host of many data communications tasks as well as replacing conventional TCUs.

Data communications functions handled by 3705 under program control include polling and addressing; data link control; line error recovery; dynamic buffer control; character code translation; line control; control character recognition; line timeout; character assembly/disassembly; error checking and recovery; and time and date stamping. In addition to performing local front-end processing for a single host, the 3705 can also operate in multihost, shared front-end processing configurations or as remote communications concentrators. In multisystem SNA network environment, the 3705 can function as an intermediate network node. In multinetwork environments, the 3705 acts as a gateway between SNA and X.25 Packet Switching Networks.

Basic hardware modules of 3705 controllers consist of a central control unit that provides logic and data paths necessary for implementing communications program control functions; memory for program and data storage; channel adapter(s) providing the I/O interface to the host; and channel scanner(s) providing for the attachment of line interface base (LIB) modules for terminal or communications line interfacing.

3705-80 Configurations • support communications tasks for up to 2 channel-attached host processors simultaneously; also support remote line concentrator operations and front-end processor-to-processor network communications • support 4 to 16 full-duplex 9600-bps asynchronous/synchronous lines; lower line attachment limits for full-duplex and higher-speed operations • maximum line speed of 57.6K bps for direct attachment, and 56K bps for modem-interfaced attachment.

3705-II Configurations • support communications tasks for up to 4 channel-attached host processors simultaneously; also support remote line concentrator operations and front-end processor-to-processor network communications • support up to 352 half-duplex 9600-bps asynchronous/synchronous lines; lower line attachment limits for full-duplex and higher-speed operations • maximum line speed of 57.6K bps for direct attachment, and 230.4K bps for modem-interfaced attachment.

☐ CPU & Memory

Central control unit (16-bit word) with 32K- to 256K-byte, 1-microsecond monolithic memory 3705-80 and 3705 Models E through H, or with 320K- to 512K-byte, 900-nanosecond memory (3705-II Models J through L) • CPU is priority interrupt driven and operates at 5 priority levels: 4 foreground and 1 background 3705-II available in 1 to 4 frame configurations: Frame 1 contains control panel, space for up to 256K bytes of memory, up to 2 channel adapters, single communication scanner, up to 4 line interface bases (LIBs), and remote program loader; Frame 2 contains space for additional 256K bytes of memory, up to 2 channel adapters, single communication scanner, and up to 6 LIBs; Frame 3 contains space for single communication scanner and up to 6 LIBs; Frame 4 contains space for single communication scanner and up to 6 LIBs • 3705-II Model E series are single frame controllers • 3705-II Model F and J series are dual frame controllers • 3705-II Model G and K series are triple frame controllers • 3705-II Model H and L series are quad frame controllers • 3705-80 available in 3 fixed configurations: M81, M82, and M83 • basic 3705-80 includes a Business Machine Clock of 134.5 bps, an Operator Panel Key Lock, and Communications Scanner Type 2 (CS2); minimum configuration also requires a channel adapter for connection to a host processor or a Remote Program Loader; other features include the CA1 and CA4 channel adapters, line sets, and line attachments to connect to communication facilities, up to 3 additional Business Machine Clocks for a total of 4 high-speed 14.4- to 57.6-bps local attachment of devices, high-speed line attachment for 19.2K bps to 56K bps using CCITT V.35 or Digital Interface, digital interface for full- or half-duplex 50K-bps line, remote program loader for remote operation.

IBM 3705-80 Model M81 • central control unit with 256K-byte memory and facilities to support 4 EIA RS-232C/CCITT V.24 Line Attachments:

$1,839/$1,565 mo	$36,600 prch	$240.00 maint

IBM 3705-80 Model M82 • central control unit with 256K-byte memory and facilities to support 8 EIA RS-232C/CCITT V.24 Line Attachments:

2,415/2,055	46,600	251.00

IBM 3705-80 Model M83 • central control unit with 256K-byte memory and facilities for 16 EIA RS-232C/CCITT V.24 Line Attachments:

2,844/2,420	52,600	262.00

3705 Model E1 • central control unit with 32K-byte memory and Frame 1:

2,003/1,705	38,230	161.00

3705 Model E2 • central control unit with 64K-byte memory and Frame 1:

2,191/1,865	39,800	181.00

3705 Model E3 • central control unit with 96K-byte memory and Frame 1:

2,379/2,025	41,370	201.00

3705 Model E4 • central control unit with 128K-byte memory and Frame 1:

2,567/2,185	42,940	221.00

3705 Model E5 • central control unit with 160K-byte memory and Frame 1:

2,755/2,345	44,510	240.00

3705 Model E6 • central control unit with 192K-byte memory and Frame 1:

2,943/2,505	46,080	260.00

MO: first figure is monthly rental charge; second figure is monthly charge for 2-year lease; both include maintenance. PRCH: purchase price. MAINT: monthly maintenance charge for purchased systems. NA: not applicable. Lease prices effective as of June 1, 1985. Purchase and maintenance prices current as of April 1985.

 ©1985 Data Decisions

IBM 3705-II & 3705-80 Communication Controllers

3705-II Models E, F, G, H, J, K & L and 3705-80 Models M81, M82 & M83

3705 Model E7 • central control unit with 224K-byte memory and Frame 1:
3,131/2,665 | 47,650 | 279.00

3705 Model E8 • central control unit with 256K-byte memory and Frame 1:
3,325/2,830 | 49,220 | 300.00

3705 Model F1 • central control unit with 32K-byte memory and Frames 1 and 2:
2,685/2,285 | 51,530 | 176.00

3705 Model F2 ○ central control unit with 64K-byte memory and Frames 1 and 2:
2,879/2,450 | 53,100 | 194.00

3705 Model F3 • central control unit with 96K-byte memory and Frames 1 and 2:
3,067/2,610 | 54,670 | 215.00

3705 Model F4 • central control unit with 128K-byte memory and Frames 1 and 2:
3,255/2,770 | 56,240 | 234.00

3705 Model F5 • central control unit with 160K-byte memory and Frames 1 and 2:
3,443/2,930 | 57,810 | 254.00

3705 Model F6 • central control unit with 192K-byte memory and Frames 1 and 2:
3,631/3,090 | 59,380 | 273.00

3705 Model F7 • central control unit with 224K-byte memory and Frames 1 and 2:
3,819/3,250 | 60,950 | 293.00

3705 Model F8 • central control unit with 256K-byte memory and Frames 1 and 2:
4,007/3,410 | 62,520 | 313.00

3705 Model G1 • central control unit with 32K-byte memory and Frames 1, 2, and 3:
3,372/2,870 | 64,830 | 189.00

3705 Model G2 • central control unit with 64K-byte memory and Frames 1, 2, and 3:
3,560/3,030 | 66,400 | 209.00

3705 Model G3 • central control unit with 96K-byte memory and Frames 1, 2, and 3:
3,748/3,190 | 67,970 | 227.00

3705 Model G4 • central control unit with 128K-byte memory and Frames 1, 2, and 3:
3,936/3,350 | 69,540 | 248.00

3705 Model G5 • central control unit with 160K-byte memory and Frames 1, 2, and 3:
4,124/3,510 | 71,110 | 267.00

3705 Model G6 • central control unit with 192K-byte memory and Frames 1, 2, and 3:
4,318/3,675 | 72,680 | 288.00

3705 Model G7 • central control unit with 224K-byte memory and Frames 1, 2, and 3:
4,506/3,835 | 74,250 | 306.00

3705 Model G8 • central control unit with 256K-byte memory and Frames 1, 2, and 3:
4,694/3,995 | 75,820 | 327.00

3705 Model H1 • central control unit with 32K-byte memory and Frames 1, 2, 3, and 4:
4,060/3,435 | 78,130 | 202.00

3705 Model H2 • central control unit with 64K-byte memory and Frames 1, 2, 3, and 4:
4,248/3,615 | 79,700 | 222.00

3705 Model H3 • central control unit with 96K-byte memory and Frames 1, 2, 3, and 4:
4,436/3,775 | 81,270 | 242.00

3705 Model H4 • central control unit with 128K-byte memory and Frames 1, 2, 3, and 4:
4,624/3,935 | 82,840 | 261.00

3705 Model H5 • central control unit with 160K-byte memory and Frames 1, 2, 3, and 4:
4,812/4,095 | 84,410 | 281.00

3705 Model H6 • central control unit with 192K-byte memory and Frames 1, 2, 3, and 4:
5,000/4,255 | 85,980 | 301.00

3705 Model H7 ○ central control unit with 224K-byte memory and Frames 1, 2, 3, and 4:
5,188/4,415 | 87,550 | 321.00

3705 Model H8 • central control unit with 256K-byte memory and Frames 1, 2, 3, and 4:
5,376/4,575 | 89,120 | 341.00

3705 Model J1 • central control unit with 320K-byte memory and Frames 1 and 2:
5,405/4,600 | 71,020 | 345.00

3705 Model J2 • central control unit with 384K-byte memory and Frames 1 and 2:
5,781/4,920 | 74,160 | 385.00

3705 Model J3 • central control unit with 448K-byte memory and Frames 1 and 2:
6,157/5,240 | 77,300 | 424.00

3705 Model J4 • central control unit with 512K-byte memory and Frames 1 and 2:
6,533/5,560 | 80,440 | 464.00

3705 Model K1 • central control unit with 320K-byte memory and Frames 1, 2, and 3:
6,087/5,180 | 84,320 | 358.00

3705 Model K2 • central control unit with 384K-byte memory and Frames 1, 2, and 3:
6,468/5,505 | 87,460 | 398.00

3705 Model K3 • central control unit with 448K-byte memory and Frames 1, 2, and 3:
6,844/5,825 | 90,600 | 437.00

3705 Model K4 • central control unit with 512K-byte memory and Frames 1, 2, and 3:
7,220/6,145 | 93,740 | 477.00

3705 Model L1 • central control unit with 320K-byte memory and Frames 1, 2, 3, and 4:
6,774/5,765 | 97,620 | 372.00

3705 Model L2 • central control unit with 384K-byte memory and Frames 1, 2, 3, and 4:
7,150/6,085 | 100,760 | 412.00

3705 Model L3 • central control unit with 448K-byte memory and Frames 1, 2, 3, and 4:
7,526/6,405 | 103,900 | 452.00

3705 Model L4 • central control unit with 512K-byte memory and Frames 1, 2, 3, and 4:
7,908/6,703 | 107,040 | 491.00

Upgrades:

3705 M82 to M83 • field-installable upgrade:
NA/NA | 6,000 | NA

3705 M81 to M82 • field-installable upgrade:
NA/NA | 10,000 | NA

3705 M81 to M83 • field-installable upgrade:
NA/NA | 16,000 | NA

3705 Frame Upgrade • additional frame for converting Models E/F/G to Models F/G/H:
NA/NA | 13,300 | NA

3705 32K Memory Upgrade • additional 32K-byte memory

©1985 Data Decisions

IBM 3705-II & 3705-80 Communication Controllers

3705-II Models E, F, G, H, J, K & L and 3705-80 Models M81, M82 & M83

modules for converting Models E/F/G to Models F/G/H or to higher memory capacity, same series configurations:

NA/NA	1,570	NA

3705 Upgrade • logic and memory change for converting Models F8/G8/H8 to Models J1/K1/L1:

NA/NA	8,500	NA

3705 64K Memory Upgrade • additional 64K-byte memory modules for converting Models F/G/H to Models J/K/L or to higher memory capacity, same series configurations:

NA/NA	3,140	NA

☐ I/O Channels

3705 controllers interface with local host processor(s) via 1 to 4 channel adapters • host attachment to 3705 adapter can be via byte multiplexer channel of S/360 Model 40 and up (in 270X emulation mode only), S/370, 3030, 3081, 3083, 3084, or 4300 processors; via block multiplexer of S/370 Model 135 and up, 3030, 3081, 3083, or 3084; or via selector channel of S/370 Model 135, 145, 165, 165-II, 168, 168-MP, or 195 processors.

1541 Type 1 Channel Adapter • for 3705-II only • transmits data via byte multiplexer channel in 1-, 2-, 3-, or 4-byte bursts, with deselection and selection between each transfer • operates under 3705 control program, with transfer rate 3705-dependent • cannot be used with 3705 Models J to L, Type 4 adapter or Type 3 Communications Scanner • requires Type 1 attachment base • maximum 1 per 3705 Models E to H:

$177/$151 mo	$2,700 prch	$9.00 maint

1542 Type 2 Channel Adapter • for 3705-II only • transmits data via byte or block multiplexer or selector channels in cycle steal mode; 2-byte bursts on byte multiplexer channels and full burst standard transfers on block multiplexer or selector channels • data rates of up to 276K bytes per second, limited only by channel capacity; requires slightly less 3705 control program intervention than 1541 adapter • maximum 1 per 3705 Model E or 2 per 3705 Model F to L:

334/284	6,470	9.00

1543 Type 3 Channel Adapter • for 3705-II only • same features as 1542 adapter described above, with 2-processor switch enhancement • 2-channel connection with host(s) may be enabled simultaneously, but data transfer occurs on alternate basis; primarily employed with 2 tightly coupled processors to provide symmetric support • maximum 1 per 3705 Model E or 2 per 3705 Model F to L:

679/578	12,910	12.00

1544 Type 4 Channel Adapter • for both 3705-II and 3705-80 • transmits data via byte or block multiplexer or selector channels • up to 32-byte bursts on byte multiplexer transfer in 3705 emulation program mode; up to 16-byte bursts for ACF/NCP/VS cycle steal mode, with up to 248-byte transfers prior to control program interruption • up to 248-byte bursts on block multiplexer or selector channel for ACF/NCP/VS cycle steal mode, with up to 248-byte transfers prior to control program interruption • cannot be used with Type 1 adapter • maximum 2 per 3705 Model E 3705-80 or 4 per 3705 Model F to L:

286/243	4,410	8.00

1551 Type 1 Channel Adapter • for 3705-80 only • transmits data via byte multiplexer channel in 1-, 2-, 3-, or 4-byte bursts, with deselection and selection between each transfer • operates under 3705 control program, with transfer rate 3705-dependent • maximum 1 per 3705-80:

207/176	3,340	9.50

8002 2-Channel Switch • allows 1541, 1542, 1544, or 1551 channel adapter attachment to 2 processor channels on the same or different hosts • operation on only 1 channel at a time • manual channel switching • cannot be used with 1543 adapter or when 2 adapters are contained within same 3705 frame:

103/88	2,090	2.50

1301 Type 1 Attachment Base • provides logic for attachment of 1541 adapter • maximum 1 per 3705-II:

27/23	641	0.50

☐ Communications Lines

Communications Scanners

Communications scanners service local/remote communications links or terminals in addition to lines to remote 3705s • up to 1 scanner per 3705 frame • up to 4 line interface bases (LIBs) per scanner in Frame 1, and up to 6 in Frames 2, 3, and 4; 22 LIBs maximum • up to 8 line sets per LIB and up to 2 lines or terminals per line set • maximum attachment of 64 lines per 3705 Model E, 160 lines per 3705 Model F and J, 256 lines per 3705 Model G and K, and 352 lines per 3705 Model H and L; scanners require Attachment Base Type 2 interface logic.

1642 Type 2 Communications Scanner • assembles/disassembles characters automatically and provides character buffering for each line • interrupts control program only when entire character is available and allows program to perform line control, control character recognition, and code translation and recovery functions • requires at least one 4650 clock and 1302 attachment base • supports up to four 4650 clocks, up to 4 LIBs in Frame 1, and up to 6 LIBs per Frame 2, 3, and 4 • maximum of 1 per frame; maximum of 1 per 3705 Model E, 2 per 3705 Model F and J, 3 per 3705 Model G and K, and 4 per 3705 Model H and L • supports X.25 Packet Switching Interface Program and X.21 Switched Interface Features:

$320/$272 mo	$4,750 prch	$9.00 maint

Modified Type 2 Communications Scanner • standard on 3705-80; assembles/disassembles characters automatically and provides character buffering for each line • interrupts control program only when entire character is available and allows program to perform line control, control character recognition, and code translation and recovery functions • 1 Business Machine Clock (134.5 bps) included in all models; 3 additional BMCs allowed in scanner • supports X.25 Packet Switching Interface Program and X.21 Switched Interface Features.

1643 Type 3 Communications Scanner • interrupts control program on multibyte, cycle steal basis for data transfers between memory and line sets • supports only synchronous LIBs and line sets; provides control character recognition for BSC and SDLC line controls; provides ASCII-to-EBCDIC and EBCDIC-to-ASCII code translation for BSC operation; provides for an auto-dial operation • includes buffer; transfer data on up to 254-character boundary • requires at least 1 4650 clock and 1302 attachment base • cannot be used with 1541 adapter • supports up to two 4650 clocks, up to 3 LIBs in Frame 1, and up to 4 LIBs per Frame 2, 3, and 4 • maximum of 1 per frame; maximum of 1 per 3705 Model E, 2 per 3705 Model F and J, 3 per 3705 Model G and K, and 4 per 3705 Model H and L • supports X.25 Packet Switching Interface Program:

1,150/979	17,210	34.00

1644 Type 3 High-Speed Communications Scanner • 230.4K-bps high-speed version of 1643 scanner • supports up to 2 half-duplex or 1 full-duplex, synchronous BSC or SDLC lines • requires 4650 clock and 1302 attachment base • supports only 4722 or 4723 line sets; cannot be used with 1541 adapter • supports one 4650 clock and 1 LIB • maximum of 1 per frame; maximum of 1 per 3705 Model E, 2 per 3705 Model F and J, 3 per 3705 Model G and K, and 4 per 3705 Model H and L • supports X.25 Packet Switching Interface Program:

1,545/1,315	25,120	40.50

Business Machine Clock • provides clocking when attached device or modem does not have clock facilities.

1409/1410/1412/1413/1414/1415/1416 Business Machine Clock • for 3705-80 only • 50/110/200/300/600/1200/2400 bps:

15/13	424	1.00

4650 Business Machine Clock • provides 45.5- to 2400-bps clocking when attached line set or modem does not have clock facilities • up to 4 per 1642 scanner, 2 per 1643 scanner, and 1 per 1644 scanner:

15/13	424	1.00

4651 Business Machine Clock • provides 14.4K-/57.6K-bps clocking for 4727 or 4728 line set • maximum 1 per frame:

41/35	880	1.50

©1985 Data Decisions

IBM 3705-II & 3705-80 Communication Controllers

3705-II Models E, F, G, H, J, K & L and 3705-80 Models M81, M82 & M83

1302 Type 2 Attachment Base • provides logic for attachment of 1642, 1643, and 1644 scanners • maximum 1 per 3705-II:

27/23	641	0.50

Line Interface Base (LIB) Modules

Integral EIA RS-232C/CCITT V.24 Line Attachments in 3705-80 support 4, 8, or 16 lines using start/stop, BSC, or SDLC line protocols at speeds up to 9600 bps. Synchronous lines can operate at 19.2K bps limiting the number of full-duplex lines to 4 on M81 and M82 and 8 lines on M83.

Any line attachment can connect to an external modem or directly to a device. A 3705-80 supports a maximum of 1 line set. The 3705-II requires Line Interface Bases (LIBs) to connect line sets that interface to modems, auto-call units, or terminals.

4701 Type 1 Line Interface Base • LIB for attachment of line sets that interface to external modems, auto-call units, or directly attached terminals • supports up to eight 4714, 4715, 4717, or 4727 lines sets; up to four 4725, 4726, or 4728 lines sets; up to two 4722 lines sets; and/or up to one 4723 line set alone or in combination • requires 1642, 1643, or 1644 scanner • maximum of 4/6/6/6 LIBs per Frame 1/2/3/4 for 1642 scanner; maximum of 3/4/4/4 LIBs per Frame 1/2/3/4 for 1643 scanner; maximum 1 LIB per frame for 1644; maximum of 4 per 3705 Model E, 10 per 3705 Model F and J, 16 per 3705 Model G and K, and 22 per 3705 Model H and L:

$69/$59 mo	$1,105 prch	$3.00 maint

4702 Type 2 Line Interface Base • LIB for attachment of up to eight 4721 line sets • requires 1642 scanner • maximum of 4/6/6/6 LIBs per Frame 1/2/3/4; maximum of 4 per 3705 Model E, 10 per 3705 Model F and J, 16 per 3705 Model G and K, and 22 per 3705 Model H and L:

69/59	1,455	2.50

4703 Type 3 Line Interface Base • LIB for attachment of up to six 4731 or 4732 line sets • requires 1642 scanner • maximum of 4/6/6/6 LIBs per Frame 1/2/3/4; maximum of 4 per 3705 Model E, 10 per 3705 Model F and J, 16 per 3705 Model G and K, and 22 per 3705 Model H and L:

125/107	2,515	2.50

4704 Type 4 Line Interface Base • LIB for attachment of up to two 4741, 4742, or 4743 line sets • requires 1642 scanner • maximum of 4/6/6/6 LIBs per Frame 1/2/3/4; maximum of 4 per 3705 Model E, 10 per 3705 Model F and J, 16 per 3705 Model G and K, and 22 per 3705 Model H and L • 4704 Type 4 Line Interface Base withdrawn:

79/67	NA	3.00

4705 Type 5 Line Interface Base • LIB for attachment of up to two 4751 or 4752 line sets • requires 1642 scanner • maximum 4 per Frame 1; maximum 4 per 3705-II • 4705 Type 5 Line Interface Base withdrawn:

177/151	NA	5.00

4706 Type 6 Line Interface Base • LIB for attachment of up to two 4761 line sets • requires 1642 scanner • maximum of 4/6/6/6 per Frame 1/2/3/4; maximum of 4 per 3705 Model E, 10 per 3705 Model F and J, 16 per 3705 Model G and K, and 22 per 3705 Model H and L • 4706 Type 6 Line Interface Base withdrawn:

177/151	NA	5.00

4707 Type 7 Line Interface Base • LIB for attachment of up to two 2400-bps switched lines; includes line set and 2400-bps modem with auto-answer and auto-call originate • requires 1642 scanner • maximum of 4/6/6/6 per Frame 1/2/3/4; maximum of 4 per 3705 Model E, 10 per 3705 Model F and J, 16 per 3705 Model G and K, and 22 per 3705 Model H and L • 4707 Type 7 Line Interface Base withdrawn:

347/295	NA	17.00

4708 Type 8 Line Interface Base • LIB for attachment of up to three 4781 or 4782 line sets • requires 1642 or 1643 scanner • maximum of 4/6/6/6 per Frame 1/2/3/4 for 1642; maximum of 3/4/4/4 per Frame 1/2/3/4 for 1643; maximum of 4 per 3705 Model E, 10 per 3705 Model F and J, 16 per 3705 Model G and K, and 22 per 3705 Model H and L:

69/59	1,455	3.50

4709 Type 9 Line Interface Base • LIB for attachment of up to two 4791 line sets • requires 1642 or 1643 scanner • maximum of 4/6/6/6 per Frame 1/2/3/4 for 1642; maximum of 3/4/4/4 per Frame 1/2/3/4 for 1643; maximum of 4 per 3705 Model E, 10 per 3705 Model F and J, 16 per 3705 Model G and K, and 22 per 3705 Model H and L:

69/59	1,455	2.50

5000 Type 10 Line Interface Base • LIB for attachment of up to six 4784 line sets • requires 1642 or 1643 scanner • maximum of 4/6/6/6 per Frame 1/2/3/4 for 1642; maximum of 3/4/4/4 per Frame 1/2/3/4 for 1643; maximum 4 per 3705 Model E, 10 per 3705 Model F and J, 16 per 3705 Model G and K, and 22 per 3705 Model H and L:

79/67	1,685	2.50

5001 Type 11 Line Interface Base • LIB for attachment of up to two 4754 or 4755 line sets • requires 1642 scanner • maximum of 4 per Frame 1; maximum of 4 per 3705-II:

159/135	NA	3.00

5002 Type 12 Line Interface Base • LIB for attachment of up to two 4785 or 4786 line sets • requires 1642 scanner • maximum of 4/6/6/6 per Frame 1/2/3/4; maximum of 4 per 3705 Model E, 10 per 3705 Model F and J, 16 per 3705 Model G and K, and 22 per 3705 Model H and L:

66/56	NA	3.00

Line Sets—Speeds to 57.6K bps (for 3705-80 only)

6712 Line Set 2 • 56K-bps CCITT V.35 attachment for 3705-80 Models M81, M82 only; includes 19.2K-bps and 48K-bps line speeds also; full- or half-duplex mode used to communicate with 3705-II in half- or full-duplex mode at 14.4K or 57.6K bps; also used to communicate with another 3705-80 in half-duplex mode via Line Set 5 • maximum 1 per controller:

$275/$234 mo	$5,440 prch	$11.00 maint

6713 Line Set 3 • 50K-bps Digital Attachment for 3705-80 Models M81 and M82 only for 1 full-duplex or 2 half-duplex synchronous lines; attaches to modem on switched or nonswitched wideband facilities (not program supported for switched facilities) • maximum 1 per controller:

244/208	4,850	9.00

6714 Line Set 4 • Auto-Call Attachment for 3705-80 Models M81, M82 only; supports 4 RS-366A/CCITT V.25 interfaces to external ACUs • maximum 1 per controller:

100/85	2,060	4.00

6715 Line Set 5 • 57.6K-bps Direct Attachment CCITT V.35 for 3705-80 Models M81, M82 only; provides local attachment for 2 half-duplex synchronous devices; includes clocking and attached device must be set for external clocking; maximum cable length 200 feet; can connect to Line Set 2 in another 3705-80; maximum 1 per controller:

497/423	10,320	14.50

5657 Line Set 8 • 9600-bps CCITT X.21 attachment for Models M81 and M82 only; provides attachment of 2 full-duplex switched or nonswitched or 2 half-duplex nonswitched synchronous lines at 2400/4800/9600 bps • switched line requires BMC at less than 1/24th of line speed and another BMC at 2400 bps for testing • limit 1 per machine:

122/104	2,600	3.50

5658 Line Set 9 • 48K-bps CCITT X.21 attachment for Models M81 and M82 only; provides attachment for 1 full-duplex, switched or nonswitched or 1 half-duplex, nonswitched synchronous line at 48K bps • switched line requires BMC at less than 1/24th of line speed and another BMC at 2400 bps for testing • limit 1 per machine:

71/60	1,550	3.00

Line Sets—Speeds to 600 bps (for 3705-II only)

4721 Type 2A Line Set • allows attachment of 2 current-loop interface TTY lines/terminals for speeds up to 200 bps • requires

©1985 Data Decisions

IBM 3705-II & 3705-80 Communication Controllers

3705-II Models E, F, G, H, J, K & L and 3705-80 Models M81, M82 & M83

4702 LIB and 4650 clock • maximum of 8 line sets per LIB, 32/48/48/48 per Frame 1/2/3/4 scanners; maximum 64 lines per 3705 Model E, 160 lines per 3705 Model F and J, 256 lines per 3705 Model G and K, and 352 lines per 3705 Model H and L:

$49/$42 mo	$1,030 prch	$3.50 maint

4731 Type 3A Line Set • allows attachment of 2 half-duplex start/stop 134.5-bps 2-wire lines without modems for limited distance transmissions • requires 4703 LIB and 4650 clock • maximum of 6 line sets per LIB, 24/36/36/36 per Frame 1/2/3/4 scanners; maximum 48 lines per 3705 Model E, 120 lines per 3705 Model F and J, 192 lines per 3705 Model G and K, and 264 lines per 3705 Model H and L:

39/34	850	1.50

4732 Type 3B Line Set • allows attachment of 2 half-duplex start/stop 134.5-bps 4-wire lines without modems for limited distance transmissions • requires 4703 LIB and 4650 clock • maximum of 6 line sets per LIB, 24/36/36/36 per Frame 1/2/3/4 scanners; maximum 48 lines per 3705 Model E, 120 lines per 3705 Model F and J, 192 lines per 3705 Model G and K, and 264 lines per 3705 Model H and L:

39/34	850	1.50

4741 Type 4A Line Set • allows attachment of 2 half-duplex start/stop 600-bps lines without modems for limited distance transmissions • requires 4704 LIB and 4650 clock • maximum of 2 line sets per LIB, 8/12/12/12 per Frame 1/2/3/4 scanners; maximum 16 lines per 3705 Model E, 40 lines per 3705 Model F and J, 64 lines per 3705 Model G and K, and 88 lines per 3705 Model H and L • 4741 Type 4A Line Set withdrawn:

69/59	NA	3.00

4742 Type 4B Line Set • allows attachment of 2 half-duplex start/stop 600-bps 2-wire lines without modems for limited distance transmissions • requires 4704 LIB and 4650 clock • maximum 2 line sets per LIB, 8/12/12/12 per Frame 1/2/3/4 scanners; maximum 16 lines per 3705 Model E, 40 lines per 3705 Model F and J, 64 lines per 3705 Model G and K, and 88 lines per 3705 Model H and L • 4742 Type 4B Line Set withdrawn:

69/59	NA	4.50

4743 Type 4C Line Set • allows attachment of 2 half-duplex start/stop 600-bps 4-wire lines without modems for limited distance transmissions • requires 4704 LIB and 4650 clock • maximum 2 line sets per LIB, 8/12/12/12 per Frame 1/2/3/4 scanners; maximum 16 lines per 3705 Model E, 40 lines per 3705 Model F and J, 64 lines per 3705 Model G and K, and 88 lines per 3705 Model H and L • 4743 Type 4C Line Set withdrawn:

69/59	NA	4.50

Lines Sets—Speeds to 1200 bps (for 3705-II only)

4781 Type 8A Line Set • allows attachment of two 1200-/600-bps start/stop or synchronous leased lines; includes 1200-bps modem • requires 4708 LIB and 4650 clock • maximum 3 per LIB, 12/18/18/18 per Frame 1/2/3/4 6142 scanners, or 9/12/12/12 per Frame 1/2/3/4 6143 scanners; maximum 24 lines per 3705 Model E, 60 per 3705 Model F and J, 96 per 3705 Model G and K, and 132 per 3705 Model H and L:

$71/$60 mo	$1,490 prch	$4.50 maint

4782 Type 8B Line Set • allows attachment of two 1200-/600-bps synchronous or two 600-bps start/stop switched lines; includes 1200-bps modem with auto-answer • requires 4708 LIB and 4650 clock • maximum 3 per LIB, 12/18/18/18 per Frame 1/2/3/4 6142 scanners, or 9/12/12/12 per Frame 1/2/3/4 6143 scanners; maximum 24 lines per 3705 Model E, 60 per 3705 Model F and J, 96 per 3705 Model G and K, and 132 per 3705 Model H and L:

94/80	1,920	6.00

4784 Type 10A Line Set • allows attachment of 1 full-duplex 1200-bps leased line; includes 1200-bps modem • requires 5000 LIB and 4650 clock • maximum 6 per LIB, 24/36/36/36 per Frame 1/2/3/4 1642 scanners, or 18/24/24/24 per Frame 1/2/3/4 1643 scanners; maximum 24 lines per 3705 Model E, 60 per 3705 Model F and J, 96 per 3705 Model G and K, and 132 per 3705 Model H and L:

135/115	2,685	5.50

4785 Type 12A Line Set • same functional capability of 4781 line set but used to support IBM 3767 terminal operating under 2741 line control at 300 bps over 2-wire lines • requires 5002 LIB and 4650 clock • maximum 2 per LIB, 8/12/12/12 per Frame 1/2/3/4 scanners; maximum 16 lines per 3705 Model E, 40 per 3705 Model F and J, 64 per 3705 Model G and K, and 88 per 3705 Model H and L • 4785 Type 12A Line Set withdrawn:

188/160	NA	15.50

4786 Type 12B Line Set • same functional capability of 4782 line set, but used to support IBM 3767 terminal operating under 2741 line control at 300 bps over switched lines • requires 5002 LIB and 4650 clock • maximum 2 per LIB, 8/12/12/12 per Frame 1/2/3/4 scanners; maximum 16 lines per 3705 Model E, 40 per 3705 Model F and J, 64 per 3705 Model G and K, and 88 per 3705 Model H and L • 4786 Type 12B Line Set withdrawn:

209/178	NA	17.50

4791 Type 9A Line Set • allows attachment of one 1200-/600-bps synchronous switched line; includes 1200-bps modem with auto-answer and auto-call originate • requires 4709 LIB and 4650 clock • maximum 2 per LIB, 8/12/12/12 per Frame 1/2/3/4 1642 scanners or 6/8/8/8 per Frame 1/2/3/4 1643 scanners; maximum 8 lines per 3705 Model E, 20 per 3705 Model F and J, 32 per 3705 Model G and K, and 44 per 3705 Model H and L:

103/88	1,785	10.00

Line Sets—Speeds to 2400 bps (for 3705-II only)

4751 Type 5A Line Set • allows attachment of one 2400-/1200-bps synchronous leased line; includes 2400-bps point-to-point modem • requires 4705 LIB • maximum 2 per LIB, 8 per Frame 1; maximum 8 lines per 3705 • 4751 Type 5A Line Set withdrawn:

$103/$88 mo	NA prch	$7.00 maint

4752 Type 5B Line Set • allows attachment of one 2400-/1200-bps synchronous leased line; includes 2400-bps multipoint modem • requires 4705 LIB • maximum 2 per LIB, 8 per Frame 1; maximum 8 lines per 3705 • 4752 Type 5B Line Set withdrawn:

93/79	NA	6.50

4754 Type 11A Line Set • allows attachment of one 2400-/1200-bps full-duplex synchronous leased line; includes 2400-bps point-to-point modem • requires 5001 LIB • maximum 2 per LIB, 8 per Frame 1; maximum 8 lines per 3705 • 4754 Type 11A Line Set withdrawn:

159/135	NA	10.00

4755 Type 11B Line Set • allows attachment of one 2400-/1200-bps full-duplex synchronous leased line; includes 2400-bps multipoint modem • requires 5001 LIB • maximum 2 per LIB, 8 per Frame 1; maximum 8 lines per 3705 • 4755 Type 11B Line Set withdrawn:

147/125	NA	8.50

4761 Type 6A Line Set • allows attachment of one 2400-/1200-bps synchronous switched line; includes 2400-bps modem with auto-answer • requires 4706 LIB • maximum 2 per LIB, 8/12/12/12 per Frame 1/2/3/4 per 6142 scanner; maximum 8 lines per 3705 Model E, 20 per 3705 Model F and J, 32 per 3705 Model G and K, and 44 per 3705 Model H and L • 4761 Type 6A Line Set withdrawn:

116/99	NA	9.00

Line Sets—Speeds to 9600 bps (for 3705-II only)

4714 Type 1D Line Set • allows attachment of 1 of the following: two 9600-bps (or less) synchronous or start/stop half-duplex switched/nonswitched lines, 1 full-duplex 9600-bps nonswitched 4-wire line with synchronous or start/stop transmission, or direct attachment of 2 half-duplex IBM terminals transmission at up to 2400 bps • requires 4701 LIB, 4650 clock and external modem except for direct connect • can be used in place of Line Set 1A, 1B, 1C, 1F, or 1H; maximum 8 per LIB,

 ©1985 Data Decisions

IBM 3705-II & 3705-80 Communication Controllers

3705-II Models E, F, G, H, J, K & L and 3705-80 Models M81, M82 & M83

32/48/48/48 per Frame 1/2/3/4 1642 scanners, or 24/32/32/32 per Frame 1/2/3/4 1643 scanners; maximum of 64 lines per 3705 Model E, 160 per 3705 Model F and J, 256 per 3705 Model G and K, and 352 per 3705 Model H and L:

$63/$54 mo	$1,030 prch	$3.00 maint

Line Sets—Speeds to 57.6K bps (for 3705-II only)

4717 Type 1G Line Set • allows attachment of one 19.2K-/50K-bps synchronous switched/leased line • requires 4701 LIB and external modem • maximum 1 per LIB for 1642/1643 scanner; must reside in first LIB per scanner; maximum 6 per frame; up to 4 lines per 3705 Model E, 10 per 3705 Model F and J, 16 per 3705 Model G and K, and 22 per 3705 Model H and L:

$135/$115 mo	$2,050 prch	$6.00 maint

4719 Type 1J Line Set • allows attachment of one 50K-bps start/stop or synchronous line • requires 4701 LIB and external MIL STD-188C modem • maximum 4/8 per LIB for 1642/1643 scanner; must reside in first LIB per scanner; maximum 8 per frame; up to 8 lines per 3705 Model E, 16 per 3705 Model F and J, 24 per 3705 Model G and K, and 32 per 3705 Model H and L:

69/59	1,455	2.50

4720 Type 1S Line Set • allows attachment of one 56K-bps CCITT V35 interface; may operate at 14.4K/57.6K bps in conjunction with 4727 line set • requires 4701 LIB and external modem • maximum 4/8 per LIB for 1642/1643 scanner; must reside in first LIB per scanner; maximum 8 per frame; up to 8 interfaces per 3705 Model E, 16 per 3705 Model F and J, 24 per 3705 Model G and K, and 32 per 3705 Model H and L:

148/126	3,020	6.00

4725 Type 1T Line Set • allows attachment of one 50K-bps full-duplex synchronous line • requires 4701 LIB, external modem and NCP program control • maximum 4 per LIB; must reside in first LIB per scanner; maximum 4 per frame; up to 4 lines per 3705 Model E, 8 per 3705 Model F and J, 12 per 3705 Model G and K, and 16 per 3705 Model H and L:

244/208	4,850	9.00

4726 Type 1U Line Set • allows attachment of one 56K-bps CCITT V35 full-duplex synchronous line • requires 4701 LIB, external modem and NCP program control • maximum 4 per LIB; must reside in first LIB per scanner; maximum 4 per frame; up to 4 lines per 3705 Model E, 8 per 3705 Model F and J, 12 per 3705 Model G and K, and 16 per 3705 Model H and L:

275/234	5,440	11.00

4727 Type 1W Line Set • allows local attachment of one 14.4K-/57.6K-bps half-duplex synchronous CCITT V35 device, such as another IBM 3705-II • requires 4701 LIB and 4651 clock; also requires 4720 line set if CCITT V35 interface not provided • maximum 8 per LIB; must reside in first LIB per scanner; maximum 8 devices per 3705 Model E, 16 per 3705 Model F and J, 24 per 3705 Model G and K, and 32 per 3705 Model H and L:

226/192	4,720	6.00

4728 Type 1Z Line Set • allows local attachment of one 14.4K-/57.6K-bps full-duplex synchronous CCITT V35 device; supports IBM 3705, 3776-3/-4 and 3777-3 attachment • requires 4701 LIB and 4651 clock; also requires 4720 line set if CCITT V35 interface not provided • maximum 8 devices per LIB; must reside in first LIB per scanner; maximum 8 devices per 3705 Model E, 16 per 3705 Model F and J, 24 per 3705 Model G and K, and 32 per 3705 Model H and L:

421/358	8,640	11.00

Line Sets—Speeds of 230.4K bps (for 3705-II only)

4722 Type 1GA Line Set • allows attachment of one 230.4K-bps half-duplex synchronous line • requires 4701 LIB, 1644 scanner, and external modem • maximum 2 per LIB; 2 per frame; maximum 2 lines per 3705 Model E, 4 per 3705 Model F and J, 6 per 3705 Model G and K, and 8 per 3705 Model H and L:

$135/$115 mo	$2,695 prch	$6.00 maint

4723 Type 1TA Line Set • allows attachment of one 230.4K-bps full-duplex synchronous line • requires 4701 LIB, 1644 scanner, and external modem • maximum 1 per LIB; 1 per frame; maximum 1 line per 3705 Model E, 2 per 3705 Model F and J, 3 per 3705 Model G and K, and 4 per 3705 Model H and L:

244/208	4,850	9.00

4715 Type 1E Line Set • for 3705-II only • provides 2 RS-366 interfaces for attachment of external auto-calling units in conjunction with 4711 1200-bps, 4714 9600-bps, or 4717 19.2K-/50K-bps line sets • requires 4701 LIB • maximum 8 per LIB:

49/42	1,030	2.50

Other 3705 Modules

5655 Nonswitched CCITT X.21 Interface Feature • for 3705-II only; operates at 2400 to 48K bps; requires Type 2 Communications Scanner:

$86/$73 mo	$2,040 prch	$3.00 maint

5656 Switched CCITT X.21 Interface Feature • for 3705-II only; operates at 2400 to 48K bps; requires Type 2 Communications Scanner:

71/60	1,700	3.00

6250 Remote Power Off • provides capability for turning 3705-II power off via command forwarded over communications line; applicable to 3705-II remote standalone operations • requires 6261 remote loader; requires power to be turned on manually:

15/13	416	0.50

6261 Remote Program Loader • provides capability for remotely loading 3705 NCP control programs with/without channel adapter • requires adapter when employed with 4705 or 5001 LIBs; cannot be used with four 1544 adapters installed:

491/418	9,335	26.50

8510 Unit Protection • provides a lock on 3705; deactivates all push buttons and switches when key is removed; included in all models:

NA/NA	35	NA

• **END**

©1985 Data Decisions

IBM 3710 Network Controller
3710 Model 1

■ PROFILE

Function • concentrator for SDLC and selected start/stop and BSC protocols over SNA/SDLC and X.25 links.

Associated Systems/Networks • supported as cluster controller (PU Type 2) on SNA; can share lines with other 3710s and other SNA devices • connects to 1 or more IBM 37X5s over SNA/SDLC or X.25 links single or multiple (upstream to host) • X.25 on upstream link • supported by software operating with MVS or MVS/XA host systems.

Communications/Networks • can connect maximum of 32 upstream and downstream (to terminal) communication lines; can concentrate up to 31 downstream lines operating at 110 to 64K bps into one or more upstream lines at speeds up to 64K bps • line between 37X5 and 3710 can be either point-to-point or multipoint; X.25 support is provided for 3725 only • devices on 3710 can communicate with any host in any domain of multidomain SNA network.

Operating Systems • runs under control of microcode shipped on diskette with system in conjunction with configuration definition supplied from control terminal or from the host using NCCF and the configuration control program function of the ACF/SSP V.3 running under MVS; configuration load stored on diskette so future loads can be direct from diskette • dynamic reconfiguration to add and delete devices does not require new configuration load from host • remote assistance is through a service adapter and modem with 3710 system operating in service or control mode • uses communication network management facilities of NCCF, NPDA, and ACF/VTAM.

Languages/Program Development • definition of 3710 is only program development provided • configuration control program is delivered as part of ACF/SSP V.3 to provide subnetwork configuration assistance and verification and configuration database function used to manage 3710 subnetworks.

Processor • base frame/enclosure includes control unit with 384K bytes of memory expandable to 512K bytes with optional 128K-byte module; diskette unit, power unit, dual CCITT V.24 (EIA RS-232C) communication (service) adapter; and integrated modem for 1200 bps, half-duplex, asynchronous auto-answer transmission • supports up to 15 communication adapter features: V.24 communication adapter for 2 lines, V.35 communication adapter for single line, and X.21 communication adapter for single line.

First Delivery • general availability planned for second quarter 1985; announced September 1984.

Systems Delivered • none.

Comparable Systems • somewhat comparable to IBM 3274 control unit in that both are SNA PU2s, but 3274 allows only directly connected devices and can support only single upstream communication link • upstream link speed for 3710 is 64K bps over SNA/SDLC or X.25 link while upstream link for 3274 is up to 56K bps over SNA/SDLC or BSC link • both can communicate over point-to-point or multipoint links and can share an SNA/SDLC multipoint link • NCR Comten's new 5620 communications processor is directly competitive with the 3710 in terms of price and number of lines supported; 5620 can also function as a remote communication processor; IBM 3710 requires 37X5 communications processor to perform network control functions and connection to host.

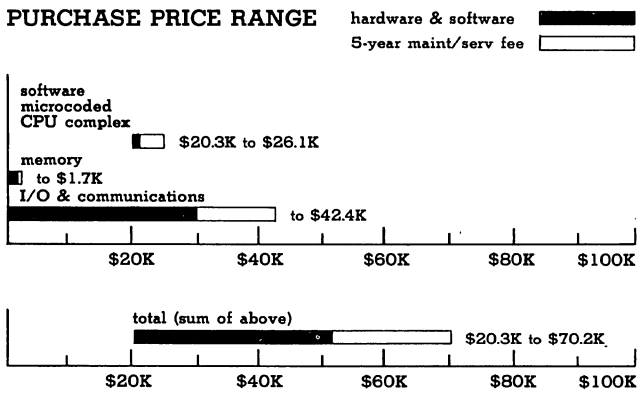
Vendor • International Business Machines (IBM) Corporation, Information Systems Group, National Accounts Division (NAD); 1133 Westchester Avenue, White Plains, NY 10604; 914-696-1900 • National Marketing Division (NMD); 4111 Northside Parkway, Atlanta, GA 30327; 404-238-2000.

Canadian Headquarters • IBM Canada Ltd; Markham, 3500 Steeles Avenue East, Markham, ON L3R 2Z1 • 416-474-2111 • offices located in other cities in Canada.

Distribution • worldwide via local IBM sales/service offices.

GSA Schedule • listed.

PURCHASE PRICE RANGE



IBM 3710 PURCHASE PRICING bar graphs illustrate the price range between small and large systems, with solid bars reflecting hardware/software purchase pricing and open bars reflecting 5-year service/maintenance fees associated with large system • **SMALL SYSTEM** is based on the IBM 3710 Model 1 with 384K-byte memory, an integral dual (communication service) adapter, an integral 1200-bps modem, an power unit, an base frame/enclosure, and an 5.25-inch diskette • **LARGE SYSTEM** includes same base configuration as small system with the following options: 128K-byte memory increment for total of 512K bytes, 1 7005 V.35 communication adapter, an 7010 X.21 communication adapter, and 13 7001 V.24 communication adapters; can attach up to 30 communication lines; does not include control console or any modems; console can be remotely located at a host site.

■ ANALYSIS

The IBM 3710 Network Controller is IBM's first concentrator although the 37X5 Series Communications Controllers can operate in remote mode to perform a concentration function. The 3710 is considerably simpler than the 37X5 to configure and also considerably cheaper. Purchase price of the smallest 37X5 (the 3705-80 Model 81, which can attach 4 EIA RS-232C lines) is over $30,000.

The announced IBM 3710 Network Controller is labeled Model 1 so there will undoubtedly be other models introduced later. The current model operates as a PU2 SNA device, the same as the 3274 control unit. Attached devices are treated as multidropped devices on a single communication line.

□ Ease of Use Features

The 3710 is a customer-configured system consisting of user pluggable/unpluggable modules. The system runs under control of microcode stored on diskette in conjunction with parameters entered from a system control console or from a remote host site. The 3710 operates with software modules in the 37X5 communications controller and host systems. It can be controlled and its configuration parameters can be downline loaded from a remote console.

©1985 Data Decisions

IBM 3710 Network Controller
3710 Model 1

☐ Modes of Operation

The IBM 3710 operates only as a remote concentrator. It can concentrate up to 31 lines onto one or more lines to single or multiple 37X5 communication controllers. It operates as an SNA PU2 device.

☐ Strengths

The IBM 3710 is simple to configure and relatively inexpensive for the concentration of a small number of lines into one or more lines to one or more IBM 37X5 communication controllers. It is an SNA device and can communicate with any device in its domain or in other domains through the NCP of an associated IBM 37X5. The 3710 extends the LPDA modem diagnostic functions from the IBM 37X5 to the network downstream of the 3710 when using IBM 386X modems. It also extends SNA networking facilities to selected BSC/RJE devices.

☐ Limitations

The IBM 3710 is small and limited to the concentration of 31 lines. It depends on an IBM 37X5 communication controller for connection to an upstream host system. It cannot connect to downstream SNA PU4 devices that are 37X5s. It requires an attached IBM 7426 Terminal Interface Unit to provide full-screen 3270 protocol conversion for selected start/stop devices. The minimum purchase price for a 7426 is $3,830.

When compared to the NCR Comten 5620, the 3710 is considerably limited. The 3710 **cannot** run the network control software and operates **only** as a node on an SNA network. The **5620 can do both**—run the network control software and operate as an SNA node. The 3710 is also limited to 512K bytes of memory. It does **not** support hard disks. The 5620 supports up to 2M bytes of memory and 10M bytes of hard disk.

This is only Model 1 of the 3710; IBM will undoubtedly add many other features for successive models.

■ SOFTWARE

There is **no** software supplied with the 3710. It runs under microcode supplied on a diskette in conjunction with the Configuration Control Program function of ACF/SSP V.3 under MVS or MVS/XA on host systems to define the 3710. The configuration definition to specify line speed, device types, protocols, and initial load is established either from the host using NCCF and the configuration control program in ACF/SSP V.3 for MVS or by using a control terminal (IBM 3101 or equivalent). The configuration load is stored on diskette for future reconfiguration without host MVS system participation. Dynamic reconfiguration to add and delete devices can be established without a complete new configuration load from the host.

The operator can configure, operate, and analyze problems from the control terminal, connected to the service adapter supplied with the 3710.

The 3710 is supported by software operating with MVS and MVS/XA at the host and 37X5 communications processor. The 3710 can operate with the following previously released software packages: ACF/VTAM 2.1 or 2.2, ACF/NCP 3.0 (on 37X5), NCCF 2.1, NPDA 3.1, and non-SNA Interconnection (BSC RJE support with IBM 3725 and NCP 3.0). In this environment, a control terminal connected to the 3710 must be used by the operator to define the configuration and to control the subnetwork.

Enhanced support for the IBM 3710 is provided by ACF/VTAM 3.0, ACF/NCP 4.0 (on 3725 only), NCCF 2.2, NPDA 3.2, NPSI 4.2 (3725 only), and ACF/SSP 3.0.

ACF/VTAM 3.0 operates with ACF/SSP 3.0 and ACF/NCP 4.0 to provide IBM 3710 trace support to isolate network problems; for MVS or MVS/XA environment only, does not apply to VSE environment.

5665-289 for MVS/XA Environment:

$6,255/$4,695 initl	**$2,085/$1,565 mo**	**$302/$483 serv**
NA/NA OTC		**NA/NA serv**

5665-313 for MVS/370 Environment:

5,130/3,840	**1,710/1,280**	**275/440**
NA/NA		**NA/NA**

5668-854 ACF/NCP 4.0

For IBM 3725 Communication Controller only for use with MVS/370, MVS/XA, and VSE; but VSE does not support the 3710 • provides LPDA on a station basis to allow LPDA testing of multipoint lines between 3710 and NCP; also provides dynamic reconfiguration support of 3710 • available third quarter 1985:

$2,085/$1,875 initl	**$695/$625 mo**	**$148/$237 serv**
NA/NA OTC		**NA/NA serv**

Network Communication Control Facility (NCCF) Version 2 Release 2 (2.2) • for MVS, MVS/XA, and VSE/AF environments but VSE/AF does not support 3710 • provides commands so an operator can control 3710 remotely: load, activate, receive new configuration with disrupting current operation, respond to self-test/status requests, and switch control functions from single upstream link to another • problem determination provided by NPDA 3.2 • availability planned for first quarter 1985 for MVS and second quarter 1985 for MVS/XA.

5668-947 for MVS/370 & MVS/XA in 24-Bit Addressing Mode:

2,250/2,010	**375/335**	**55/88**
NA/NA		**NA/NA**

5665-316 for MVS/XA in 31-Bit Addressing Mode:

2,730/2,460	**455/410**	**66/106**
NA/NA		**NA/NA**

Network Problem Determination Application (NPDA) Version 3 Release 2 (3.2) • for MVS/370, MVS/XA, and VSE/AF but VSE/AF does support 3710 • operates as NCCF application; provides summary and detailed information for determining probable cause of network errors • uses data supplied by LPDA and other supported services to determine probable cause among errors in 37X5, 3710, lines, modems, modem interfaces, or terminals • can display alert messages on error conditions and formatted test results on upstream and downstream lines from 3710 • planned availability is first quarter 1985 for MVS/370 and second quarter 1985 for MVS/XA.

5668-920 for MVS/370 & MVS/XA in 24-Bit Addressing Mode:

1,650/1,237	**264/198**	**22/35**
NA/NA		**NA/NA**

5665-321 for MVS/XX in 31-Bit Addressing Mode:

1,920/1,440	**320/240**	**28/45**
NA/NA		**NA/NA**

5668-981 X.25 NCP Packet Switching Interface (NPSI) 4.2 • for MVS/370, MVS/XA, and VSE, but VSE does not support 3710 • operates in ACF/NCP 4.0 environment on IBM 3725; allows SNA host communication with IBM 3710 across X.25 networks • supports link speeds from 1200 to 56K bps • available fourth quarter 1985:

770/577	**269/202**	**40/64**
NA/NA		**NA/NA**

ACF/System Support Program (SSP) Version 3 (3.0) for IBM 3705 & 3725 Communication Controllers • operates in conjunction with ACF/VTAM 3.0 to support 3710 trace • Configuration Control Program is a new function that runs as an Interactive System Productivity Facility (ISPF) application to define and generate a configuration for 3710 and its attached devices in an SNA network • outputs are NCCF CLISTS that can be used to load and activate a selected set of IBM 3710s in a network and PU and LU definition statements for NCP generation • menu-driven, user-friendly ISDF dialogs to configure 3710;

INITL: first figure is initial charge for primary system; second figure is for distributed system (DSLO). MO: first figure is monthly license for primary system; second figure is for distributed system (DSLO). SERV: first figure is monthly service charge for a single system (MLPSC); second figure is for multiple systems (MMPLSC). OTC: one-time charge. Prices current as of March 1985.

©**1985 Data Decisions**

IBM 3710 Network Controller
3710 Model 1

allows generation of reconfiguration commands for 3710 and reconfiguration statements for VTAM to add/delete 3710 attached devices dynamically; allows definition of X.25 protocols between 3725 and 3710 • planned availability is second quarter 1985 for MVS.

5665-338 ACF/SSP 3.0 for MVS:

1,605/1,200	535/400	71/114
NA/NA		NA/NA

■ HARDWARE

☐ Terms & Support

Terms • the 3710 Network Controller is currently available under Plan D on a purchase or 30-day rental basis • IBM allows up to 65% of first 6 months rental charges to be accrued towards purchase • 3710 designated as a customer set-up machine (4 days) but IBM will set it up for a fee • 15% educational allowance • warranty period is one year; warranty service is Customer On-Site Exchange.

Support • 3710 marketed and supported through nationwide network of local IBM offices • maintenance bundled into rental charges, and extra for purchased units; basic monthly maintenance charges cited in text for purchased equipment only with availability on 9 consecutive hours, 7:00 AM to 6:00 PM, Monday through Friday basis; extended service for weekends or before/after standard hours at premiums over basic rate cited full, 24-hour, 7-day service adds 47% premium to fees • initial period of maintenance is 3 months • remote service is used to diagnose problems unresolved by customer • initial maintenance service is 3 months • IBM is now offering a new on-site Exchange Warranty Option with annual maintenance charges for IBM On-Site Exchange (IOE), Customer On-Site Exchange (COE), Customer Carrier-In Exchange (CCE), and Customer Carry-In Repair (CCR).

☐ Overview

The IBM 3710 Network Controller is a concentrator that operates as a Physical Unit 2 (PU2) on SNA networks. The 3710 does not support PU4 devices downstream; PU4 devices are nodal processors such as the 37X5 communication controllers. The 3274 Cluster Controller is also a PU2 device on SNA. The 3710 can share multidrop lines with other SNA devices such as the 3274. So far, the 3710 consists only of Model 1 that can attach up to 32 data communication lines. These can be divided any way the user desires between upstream lines to hosts and downstream lines to terminals. The downstream lines can support SDLC or selected start/stop and BSC protocols. The upstream lines can be SNA/SDLC or X.25 links. In addition to concentration, the 3710 provides protocol enveloping, like NTO in 37X5, to support non-SNA devices on SNA networks. It also supports full-screen 3270 protocol conversion via an attached IBM 7426 Terminal Interface Unit Model 2. The 3710 connects to upstream host mainframes through single or multiple 3705/3725s through single or multiple links. Line speeds can range from 110 to 64K bps. Downstream devices appear as additional physical units on a multidropped line, and are operator-assigned to specific upstream links.

The IBM 3710 Model 1 includes a base frame/enclosure, diskette unit, control unit with 384K bytes of storage, power unit, dual CCITT V.24 (EIA RS-232C) communication adapter, and integrated modem that operates at 1200 bps in half-duplex, asynchronous auto-answer mode. An additional 128K-byte memory module is optional. The integral adapter is the service adapter supported by the integrated modem for IBM remote assistance (in service mode). When the modem is not in service mode, it can be used in conjunction with a service adapter for dial-in communication with the 3710.

When the 3710 is in control mode, an operator from a user-supplied control terminal (IBM 3101 or equivalent) can configure, operate, and analyze the 3710. The control terminal can be either directly attached to the 3710 or remotely attached through the public switched network. Transmission speed is 1200 bps using the integral modem. If the customer provides a standalone modem, the service adapter will support a full-duplex 3101-compatible control terminal operating at speeds up to 9600 bps.

The 3710 can attach up to 15 additional communication adapters, which are available in 3 types that can be intermixed in any combination. The V.24 adapter can attach up to 2 V.24 DCEs controlling communication lines or 2 V.24 DTE devices or DCE and DTE. The data rate through the RS-232C interface is up to 19.2K bps. The V.35 adapter can attach a DCE controlling a V.35 DCE/DTE. The data rate through the V.35 interface is limited to 64K bps. The X.21 adapter can attach a nonswitched X.21 DCE device. The data rate through the X.21 adapter is up to 64K bps.

The 3710 supports the following downstream devices over switched or nonswitched point-to-point links. TWX 33/35, IBM 3101 or IBM PC in TWX 33/35 compatibility mode, 3780 BSC protocol interface devices or equivalent, and JES BSC/RJE multileaving interface devices or equivalent. The 3710 supports the 3271/3274/3276 control units with BSC interface over multipoint or nonswitched point-to-point lines with multipoint line control. It supports other SNA PU2 devices (including another 3710) over nonswitched point-to-point lines and IBM 7426 Terminal Interface Unit over point-to-point, nonswitched, or switched lines. The 3710s can be cascaded to only 1 level.

The 3710 runs under control of microcode loaded from diskette in conjunction with configuration data entered from a local or remote control console or from a remote host. The configuration data is stored on diskette. See Software section.

The 3710 supports Modulo 128 transmissions, both upstream and downstream on SNA/SDLC links, meaning it can transmit 127 message frames before it requires an acknowledgement.

☐ CPU & Memory

The basic 3710 includes a control unit, main memory, power supply, integral dual V.24 adapter, and integral half-duplex, 1200 bps, asynchronous auto-answer modem. It can attach up to 15 additional adapters and an optional 128K-byte main memory module for a total of 512K bytes of memory.

IBM 3710 Network Controller, Model 1 • basic unit can be installed as tabletop or rackmounted; all components are packaged as pluggable units that can be installed and removed by customer • planned availability is second quarter 1985:

		$1,185 mo	$20,300 prch	$97 maint
$358 EWO	$1,160 IOE	$802 COE	$753 CCE	$753 CCR

7020 128K-Byte Storage Expansion • maximum of 1 per 3710 Model 1:

		83	1,500	3
5	30	25	23	23

I/O & Communications

There are no facilities for I/O devices other than the integral diskette unit. A user-supplied 310 (or equivalent) terminal can be attached to the integrated dual communications adapter as a control console.

☐ Communication Lines

Communication lines attach to the 3710 through up to 16 adapters. The basic 3710 contains an integral adapter and can accommodate up to 15 additional user-specified adapters.

Integrated Dual Communication Adapter • the service adapter supported by the integrated 1200-bps asynchronous, auto-answer modem; when modem is not being used for remote assistance, it can be used with service adapter as a dial-in attachment • a 3101 or equivalent control terminal can be directly attached to 3710 or it can be attached through public

MO: monthly rental charge; includes maintenance. PRCH: purchase price. MAINT: monthly maintenance charge for purchased systems. NA: not available or applicable. EWO: Exchange Warranty Option. IOE: IBM On-Site Exchange. COE: Customer On-Site Exchange. CCE: Customer Carry-in Exchange. CCR: Customer Carry-in Repair. Prices current as of March 1985.

 ©1985 Data Decisions

IBM 3710 Network Controller
3710 Model 1

switched network; data rate is 1200 bps using integrated modem; with user-supplied external modem, the service adapter supports full-duplex communication with the 3101 at data rates up to 9600 bps.

7001 V.24/EIA RS-232C Communication Adapter • system feature; can attach up to 2 V.24 DCEs controlling communication lines or 2 V.24 DTE devices or 1 of each • maximum of 2 cables can be attached; both lines/devices must use same link-level protocol:

		$120 mo	$2,000 prch	$13 maint
$22 EWO	$160 IOE	$138 COE	$135 CCE	$135 CCR

7005 V.35 Communication Adapter • system feature; can attach 1 DCE controlling a V.35 DCE/DTE:

		121	2,000	14
25	166	141	138	138

7010 X.21 Communication Adapter • system feature; can attach 1 nonswitched X.21 DCE device:

		139	2,200	20
29	234	205	191	191

• END

©1985 Data Decisions

IBM 3725 Series Communication Controllers
3725 Models 1 & 2

■ PROFILE

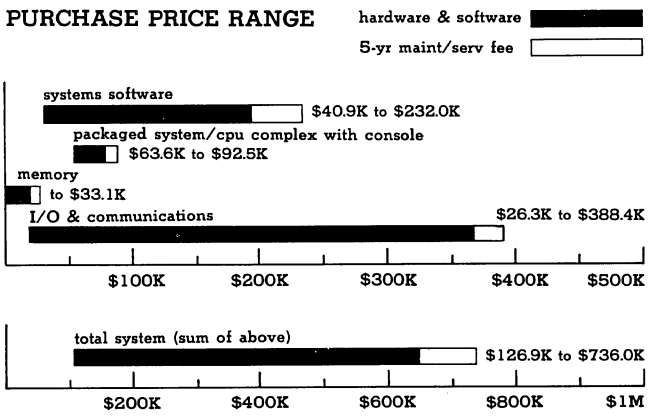
Function • programmable local/remote communication controllers • operate as intermediate nodes in SNA networks.

Associated Systems/Networks • IBM S/370, 303X, 3081, 3083, 3084, and 4300, single-/multiprocessor SNA networks • S/360 Model 40 upwards in 270X emulation mode only • X.25 gateway from SNA to other networks.

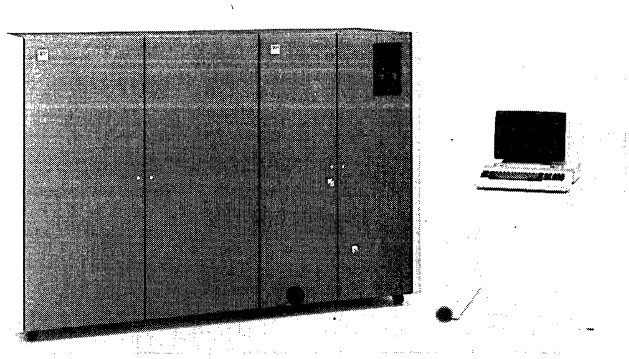
Communications/Networks • supports up to 80 (Model 2) or 256 (Model 1) half- or full-duplex lines at 50 bps to 256K bps; RPQ for very high-speed lines for Model 1 ranging from 512K to 1.544M bps; interfaces for BSC, SDLC, and start/stop asynchronous transmission with auto-call • can attach to up to 4 (Model 2) or 8 (Model 1) IBM S/370-compatible host channels, 2 (Model 2) or 6 (Model 1) can operate concurrently; can coreside compatibly on SNA networks with 3705 communication controllers running under ACF/NCP Version 2 for 3705 and ACF/NCP.

Operating Systems • ACF/NCP 4.0 for 3725 or EP/3725 1.2 or both can run concurrently in Partitioned Emulation Program (PEP) mode; generated and loaded from the host operating in either the DOS/VS or OS/VS environment; requires ACF/VTAM 2.1/2.2/3.0 or ACF/TCAM 2.4 access method for host communication.

PURCHASE PRICE RANGE



IBM SERIES 3725 PURCHASE PRICING bar graphs illustrate the price range between small and large systems, with solid bars reflecting hardware/software purchase pricing, and open bars reflecting 5-year service/maintenance fees associated with the large system • **SMALL SYSTEM** is based on the IBM 3725 Model 2 with 512K-byte memory, 1 integral line attachment base, integral scanner, integral clock, and ACF/NCP/VS 4.0 for the 3725; options include 6 line interface couplers to attach 24 full-duplex, 9600-bps communication lines, 1 channel adapter to connect to IBM S/370-compatible host, and 3727 operator console • **LARGE SYSTEM** includes IBM 3725 Model 1 with 512K-byte memory, 2 integral line attachment bases (for up to 96 lines), and 2 integral scanners; options include 6 256K-byte memory increments (for 2M-byte total memory), 3727 operator console, 1 4921 Line Interface Coupler for 230.4K-bps line, 3726 communication controller expansion (for up to 160 lines), 3602 Line Increase Feature, 6 4771 Line Attachment Bases Type A (with integral scanners), 56 4911 Line Interface Couplers Type 1 (support up to 224 full-duplex 9600-bps lines), 2 4666 Internal Clock Controls, 8 1561 Channel Adapters, 2 8320 2-Processor Switches, ACF/NCP/VS 4.0 for 3725, EP 2.0 for 3725, NTO 2.1 for 3725, X.25 NPSI 1.4.2, and ACF/SSP 3.0 (runs on host for program development) • **SMALL** configuration supports 1 host and 24 full-duplex 9600-bps lines; **LARGE** configuration supports 8 channel adapters to same or different S/370-compatible hosts (6 channels can operate concurrently), 1 230.4K-bps full-duplex line, and 224 full-duplex 9600-bps lines • software price calculated as initial license fee plus 5 years of monthly license fee.



Languages/Program Development • 3725 assembly and macro language runs under ACF/SSP 3.0 (for ACP/NCP 4.0) on S/370-compatible host running under MVS/370 or MVS/XA.

Processor • includes 512K-byte (Models 1 and 2) memory with up to 6 256K-byte modules optional on both Models for maximum memory of 2M bytes; no disk support, but diskette used to run diagnostics • consists of central control unit (CCU), main storage, maintenance and operator subsystem (MOSS), transmission subsystem (TSS), and 2 line attachment bases (CLABs) • MOSS includes IPL and utility procedures for 3725 operator; implemented using independent processor with microcode, diskette drive, and operator console attachment; 3727 Operator Console required for maintenance • TSS includes line attachment bases (LABs) with microprocessor-based scanners, line interface couplers (LICs), and optional internal clock control (ICC) units; integrated modems unavailable but compatible with IBM modems 3863 Models 1 and 2, 3864 Models 1 and 2, 3865 Models 1 and 2, 3872, and 3874, as well as 3867 Link Diagnostic Unit • Model 1 supports up to 96 lines in basic system, 2 channel adapters, and 2 Two-Processor Switches; requires 3726 Communication Controller Expansion to support 4 additional channel adapters and up to 160 additional communication lines.

First Delivery • fourth quarter 1983 for Model 1 and first quarter 1984 for Model 2.

Systems Delivered • unknown.

Comparable Systems • only Amdahl 4705 and NCR/Comten 3600 Series in NCP environment • Amdahl 4705 is software compatible with 3705 and can run ACF/NCP Version 2 for the 3705; it cannot, however, run any ACF/NCP for the 3725 • the NCR/Comten 3600 runs under CNS which is functionally compatible with ACF/NCP Version 2 and offers some additional features • other systems as well as Amdahl 4705 and NCR/Comten 3600 are comparable to 3725 running in EP/3725 mode although they cannot run EP/3725: Codex 6520 and CCI-80 Series.

Vendor • International Business Machines (IBM) Corporation, Information Systems Group • National Accounts Division (NAD); 1133 Westchester Avenue, White Plains, NY 10604; 914-696-1900 • National Marketing Division (NMD); 4111 Northside Parkway, Atlanta, GA 30327; 404-238-2000.

■ ANALYSIS

The successor to the IBM 3705 was a subject of many discussions

 ©**1984 Data Decisions**

IBM 3725 Series Communication Controllers
3725 Models 1 & 2

and articles over several years. Its predicted characteristics were enumerated over and over again including corrections for everything missing in the 3705 and all the useful features found in local and remote front ends offered by competing vendors. In this context, it is no wonder the real IBM 3725 did not live up to its advanced billing. The "experts" rationalized the disparity between reality and predictions by explaining that the announced 3725 models represented only the "tip of the iceberg." The real 3725, a veritable giant of a communication controller, is still submerged. IBM, however, is gradually upgrading the 3725.

One major benefit of the IBM 3725 is the Maintenance and Operator Subsystem (MOSS), implemented through a microcoded, dedicated, independent processor, a diskette drive, and an operator console. MOSS provides host-independent problem isolation for most hardware failures. It provides error records for the 3725 and logs them on the diskette where they are available to maintenance personnel through the operator console. Diagnostics can be run through MOSS with no host involvement.

MOSS also maintains a configuration data file, automatically generated by sensing the actual configuration. The file is used to create a graphic configuration file to represent the actual configuration for ordering and installing upgrades.

MOSS generates awareness messages when problems occur that affect network operation and forwards them through ACF/NCP to the Network Control Communication Facility (NCCF) operator's console when NCCF and Network Problem Determination Application (NPDA) are operating in the host, or to the host operator's console if NCCF and NPDA are not operational.

The operator interface to the 3725 provides guidance to the operator through menus and prompts for easy access to MOSS functions, such as wrap tests, line tests, and storage displays.

Other salient features of the IBM 3725 include a Central Control Unit (CCU), which executes instructions to control channel adapters and communication scanners. The CCU runs under control of a different version of ACF/NCP and EP than the one offered for the IBM 3705. The operating systems are labeled specifically for the 3725, but compatible versions that allow 3725s and 3705s to coreside on SNA networks are also available for the 3705 up to ACF/NCP 3.0. After 3.0, no further enhancements to ACF/NCP are planned for 3705. An obvious reason why different operating systems are required is the MOSS facility in the IBM 3725. The IBM 3725 can communicate with remote S/370-compatible hosts through 3705 front ends and vice versa.

New versions of other software packages are required for operation with the 3725: NTO (Network Terminal Option) and X.25 NCP Packet Switching Interface (NPSI) that run on the 3725 as well as new versions of NPDA, NCCF, ACF/SSP, ACF/TCAM, and ACF/VTAM running on the host processor.

Performance of the IBM 3725 is roughly twice that of the IBM 3705. The number of lines supported is 1.8 to 1.9 times that of the 3705 for high-speed lines up to 230.4K bps and 3.2 to 3.5 times for low-to-medium-speed lines up to 2400 bps. The maximum number of half- or full-duplex lines supported by the IBM 3725 is 256 as compared to 352 half-duplex lines for the 3705. Also, the 3725 now supports many high-speed lines ranging from 512K to 1.54M bps.

The IBM 3725 can connect to up to 8 host processor channels, 6 of which can operate concurrently as compared to 4 channel-attached hosts for the 3705. Maximum memory for the 3725 is larger: 2M bytes compared to 512K bytes for the 3705. The IBM 3725 is easier to configure than the 3705 and simpler in structure. Communication scanners are integral to the base systems and built into the line attachment bases when line capacity is expanded.

The reliability, availability, and serviceability (RAS) facilities have been improved for the 3725 over the 3705. The IBM 3725 provides continuous operation through controlled shutdown of failed units.

The IBM 3725 continues IBM's trend of making compatibility more difficult for competing vendors. Amdahl can run ACF/NCP V2 and EP for the 3705, but cannot run any ACF/NCP Version for 3725 and EP/3725, primarily because of the support required for the MOSS facility. The NCR/Comten 3600 and its CNS operating system already provide many of the functions implemented in the 3725. NCR/Comten will undoubtedly have to alter its software to adjust to the new versions of NCCF, NPDA, and the VTAM/TCAM access methods. Basically, the 3725 has now replaced the 3705. All new developments will be for the 3725 only.

IBM has substantially increased prices on its networking software. The price of ACF/NCP has more than doubled from ACF/NCP 2.0 to ACF/NCP 4.0. The price of ACF/SSP has risen even more: by a factor of 5 from ACF/SSP 2.1.1 to ACF/SSP 3.0. The prices on a few packages such as EP/3725 have been reduced by a modest amount. This trend continues IBM's moves in the past few years to collect more revenues from software. All software for the 3725 now carries an initial license fee, a monthly license fee, and a monthly service fee.

☐ Ease of Use Features

The operator interface to the IBM 3725 is supported through the new MOSS facility. It provides prepared menus to guide the operator through tests and problem determination facilities. The operator console is also supported through a macro language to allow its facilities to be tailored for the specific network configuration. Alternate consoles can be configured so the console can be located up to 490 feet from the IBM 3725.

☐ Modes of Operation

The IBM 3725 can operate as a channel-attached front end to a S/370-compatible host, or it can function as a remote front end (concentrator). It can operate in standalone NCP or standalone EP mode or in Partitioned Emulation Program (PEP) mode when both ACF/NCP for 3725 and EP/3725 operating systems are loaded into the system. EP/3725 allows the 3725 to emulate the operation of the old 270X communication controllers. ACF/NCP also will support NTO so that SDLC and BSC devices can reside compatibly in SNA networks.

The IBM 3725 can operate much more autonomously than the 3705. Once its parameters are loaded and commands given from the host, the 3725 can control, operate, maintain, and diagnose the network independently of the host processor.

☐ Strengths

The IBM 3725 like the 3705 before it serves a central role in IBM's approach to networking and distributed processing. IBM has been slow to relinquish host control of its SNA networks, but new products are moving an increasing number of functions away from the host. The IBM 3725 continues this trend with the functions provided by the MOSS facility.

The slow dispersal of functions into a system like the IBM 3725 is understandable because of its impact on other products. It bridges the gap between IBM's wide variety of terminal devices and a broad range of host processors. Whatever shortcomings the 3705 has had as a communication controller, it performed and it performed reliably. The IBM 3725 must match that reliability using new technology, provide new functions, and remain compatible.

The IBM 3725 as announced was a relatively conservative product, but it lays the groundwork for moving functions away from the host processor. The network test, maintenance, and control now reside in the 3725 and can operate independently of the host. Memory has now been quadrupled to 2M bytes, a substantial increase. The number of high-speed lines has been increased, and RPQs are available for very high-speed lines, 512K to 1.544M bps.

The 3725 is compatible with the 3705 in the sense that they can coreside in the same SNA network and intercommunicate. Because of the 3725's new functionality, it is not software compatible with the 3705.

The IBM 3725 is relatively simple in structure and easy to configure. The number of piece parts and number of models have been considerably reduced over the 3705. The functions in the MOSS facility make it easy to use. It provides a needed upgrade for the 3705, but it is not so spectacular customers will dump all

 ©**1984 Data Decisions**

IBM 3725 Series Communication Controllers
3725 Models 1 & 2

their 3705s and order it immediately. The features of 3725 are being improved and development on 3705 stopped. It is now time for IBM customers to move to 3725.

☐ Limitations

The IBM 3725 did not live up to the expectations generated by predictions of its characteristics. No disk storage is provided other than the diskette in the MOSS unit. The System Service Control Program (SSCP) still resides in the host. The only functions moved out from the host are those associated with problem determination, maintenance, and service.

One criticism of the 3725 is that it is expensive to configure with a small number of lines. With the introduction of the IBM 3710 Network Controller, the 3725 need not be used for concentration of small numbers of lines into one or more lines back to a host site. Currently, the 3710 is very limited with respect to the 3725 facility, but the initial announcement included only a Model 1, which will undoubtedly be joined by others over time.

■ SOFTWARE

☐ Terms & Support

Terms • software fees include an initial basic license charge plus a monthly license charge for the first system; each additional system that runs the software is charged a Distributed System License Option (DSLO) initial license fee plus a DSLO monthly fee; testing period for the basic license is 2 months; no testing period is provided for the DSLO licenses • IBM requires a monthly licensed program support charge (MLPSC) for the basic license if only 1 system is supported or a monthly multiple licensed program support charge (MMLPSC) if multiple systems are supported • some licensed program modules are available in source code; other modules designated "RESTRICTED MATERIALS OF IBM" are available in object code only.

Support • includes central service from IBM support center as well as local licensed program support from IBM Field Engineering; local support is in accordance with the terms and conditions provided under IBM's Agreement for Local Licensed Program Support at the MLPSC, MMLPSC, or IBM hourly service rate.

☐ Operating Systems

The operating system residing in 3725 controllers handles the data transfers between stations and hosts in the communications network. It is generated at the host using IBM-supplied macro language with assembler and utility software. The operating system is loaded from the host, and executed in response to host commands. It takes 2 forms: Advanced Control Function/Network Control Program (ACF/NCP) for the IBM 3725 to perform full-function front-end processing tasks, and Emulation Program for 3725 (EP/3725) to emulate IBM 2701/2702/2703 (270X) hardwired controllers.

ACF/NCP 3.0 for IBM 3725 and the EP/3725 are compatible with, but enhanced versions of, the ACF/NCP 3.0 and EP for the 3705. Both 3705 and 3725 systems can coreside on the same network: a remote 3725 can communicate with a host system through a local channel-attached 3705 and vice versa. ACF/NCP 3.0 is the last release that will be developed for both 3705 and 3725. ACF/NCP 4.0 is for 3725 only. ACF/NCP 4.0 supports IBM's new 3710 Network Processor as well as the new 3725 functions and features.

ACF/NCP for 3725 and EP/3725 can each run standalone on the 3725 or can run concurrently to provide Partitioned Emulation Programming (PEP) extension to ACF/NCP for IBM 3725.

Both operating systems for the 3725 require the ACF/System Support Programs (ACF/SSP) running on an IBM S/370-compatible host computer for system generation. Both were designed to support host systems running under VSE/AF, OS/VS1, MVS/370, and MVS/XA operating systems. The EP/3725 also supports host systems running under VM/SP and CMS. MVS/370 refers to MVS 3.8, MVS 3.8 with System Extension licensed program, and MVS 3.8 with the SP Version 1 licensed program.

Both operating systems for 3725 offer enhanced features over those of the comparable operating systems running on 3705: enhanced problem determination and error recording and notification, and improved availability through continued operation and controlled shutdown when various failures occur. The 3725 controller operator under either system can perform a wrap test, activate a line test for testing the operation of lines and modems, obtain a dump of the controller's maintenance and diagnostic records or of the communication scanner processor (CSP) storage or maintenance and operator subsystem storage, activate line trace, and activate scanner interface trace for a given line to isolate problems to NCP, EP, or CSP.

☐ Networks/Communications

NCP Software

NCP manages the physical communications network; includes functions associated with conventional transmission control units such as control character recognition, line time-out control, error checking, and character assembly/disassembly. NCP also assumes most of the communications line control from host access method; such functions include multipoint line polling/addressing, switched network dial/answer, character/bit/buffer interrupt control, control character insert/delete, asynchronous/BSC character code translation into/out of EBCDIC, dynamic buffering, local/remote controller block/message transmission control, error recording/diagnostics, error recovery/diagnostics, and certain other channel/terminal access/delay functions. NCP also incorporates certain dynamic control functions such as line activate/deactivate, line status request, ID/polling/addressing character, replacement, multipoint poll/address order change, and rescheduling. Concurrent NCP and EP mode operation provides Partitioned Emulation Programming (PEP) mode. NCP allows 3725 to operate as remote communications concentrator, and for speed selection involving lines equipped with IBM modems.

5735-XX9 ACF/NCP Version 2 (2.0) for 3725 • Advanced Communication Function (ACF)/NCP Version 2 for 3725 designed for users of OS/VS1, OS/VS2(MVS), and DOS/VSE running on IBM S/370-compatible systems • offers all same the functions for IBM 3725 as those provided by the ACF/NCP Version 2 for IBM 3705 plus the following additional features • better problem determination and performance evaluation tools for system operator at the 3727 operator console include wrap test; ability to activate line test for lines and modems; ability to obtain dump of records in controller service processor storage, communication scanner processor memory, and maintenance and operator subsystem (MOSS) storage; specification of number of bytes of data (up to 254) in trace in lieu of full trace; and ability to activate a scanner interface trace for a given line • more error recording and notification in conjunction with 3725 MOSS hardware includes records stored in controller and sent to host processor in response to requests and alert messages sent automatically to notify host of serious and permanent errors in the 3725 controller; internal error records include channel adapter, program checks, unresolved interrupts, communication scanner, and software errors; external or network error records include BSC/SS station statistics and permanent BSC/SS line error, and permanent SNA link and station errors • added availability by continuing to operate and to control shutdown when unrecoverable level 1 error occurs on IBM 3725 channel adapter or on single communication scanner, or when IBM 3725 MOSS fails • time to generate and maintain NCP reduced by eliminating conditional assemblies • supports X.25 NCP Packet Switching Interface (NPSI) Release 4 • supports 1M-byte memory on 3725 • requires IBM 3725 communications controller to be either channel attached or remotely connected to a S/370-compatible host; when remotely connected, requires an SDLC link to a 3705 or 3725 channel attached to S/370-compatible host • requires ACF/SSP V2 R1.1 running on S/370-compatible host for program development; host must be running under VSE/AF R3, OS/VS R.7, MVS/370 (3.8 or 3.8 with System Extension or with SP V.1) or MVS/XA with appropriate access method release: ACF/TCAM V2 R4, ACF/VTAM V1 R3 (MVS only), or ACF/VTAM V2:

$1,080/$810 initl	$216/$162 mo	$59/$94 serv

 ©**1984 Data Decisions**

IBM 3725 Series Communication Controllers
3725 Models 1 & 2

ACF/NCP Version 3 (3.0) • provides same facilities as 2.0; for both 3705 and 3725 for MVS/370 and MVS/XA (compatibility mode) • allows independent SNA networks to communicate using SNA Network Interconnection (SNI) in conjunction with ACF/VTAM 2.2; allows forced deactivation of SNA resources and non-SNA lines; extend support for IBM 3863/4/5/8 modems to report signal level and execution of LPDA commands on multiplexed data links and tail circuit attached links; provides improved problem determination through session path trace and physical-addresses-to-logical names map in conjunction with NLDM • ACF/NCP 3.0 and ACF/VTAM 2.2 can act as gateway NCP and gateway SSCP to manage and control sessions across SNA networks; each SNA network retains its own names, elements, control, and security; all cross-domain LU-LU sessions now supported continue to be supported; interconnected networks can use the 16-bit address differently, they are transformed from one network to another through the alias name translation function in NCCF 2.0; supports BSC 3270 terminals in cross-network sessions; networks can be interconnected by multiple gateways; one gateway NCP can attach up to 255 networks and can be used by up to 8 SSCPs; a cross-network session can go through a number of networks • links across an intermediate routing node (IRN) operate in modulo 128 mode, allowing 127 blocks to be transmitted before an acknowledgement is required • this is final NCP release for 3705, no further enhancements are planned • requires ACF/SSP 2.2 for program generation; requires the following host program for full functionality: ACF/VTAM 2.0, EREPMVS, NPA, NPDA 3.0, NCCF 2.0, and NLDM 2.0; other programs supported at their level only • designed to operate with NTO 2.1, NRF 1.5, X.25 NPSI, and non-SNA Interconnection programs • available February 1984:

2,400/2,160	400/360	135/216

ACF/NCP Version 4 (4.0) for 3725 • continues support of same functions and facilities as 3.0; operates with MVS/370, MVS/XA, or VSE environment on the host; provides extended network addressing, enhanced network management, and support for IBM 3710 Network Controller • in conjunction with ACF/VTAM 3.0, extended network addressing from 16 bits to 23 bits with 8 bits for subarea and 15 bits for element; thus, it allows 255 subareas and 32K elements per subarea for addressing a total of 8M elements within a single network • returns SNI session-related data to NLDM 1.3 for problem determination; can respond to operator command to start/stop function for one or all SNI sessions • when threshold value exceeded for traffic count or number of errors, a statistical record with cause code is sent to NPDA 3.2 • commands from NCCF 2.2 accepted to query and modify the transmit and error thresholds for BSC devices and SNA stations and to display or alter LPDA parameters (allows installation of IBM 386X modems without requiring NCP SYSGEN) • supports IBM 3710 Network Controller: provides LPDA on a station basis to allow LPDA testing of multipoint lines between 3710 and NCP and provides dynamic reconfiguration support of 3710 • modulo 128 transmissions now supported for boundary network node (BNN) as well as for intermediate network node (INN) links • a forced resetting of "hung" SNA resources is now permitted; preselected trace tasks can be provided with trace data maintained in NCP storage; it can be formatted by an ACF/SSP dump • requires ACF/SSP 3.0 for MVS/370 (MVS/SP 1.0) and MVS/XA (MVS/SP 2.1); ACF/SSP 3.0 provides for loading, dumping, and tracing ACF/NCP 4.0 when operating in MVS environment • requires EP for 3725 1.2 for use of PEP with ACF/NCP 4.0 • compatible with the following host programs: ACP/SSP 3.0, ACT/TCAM 2.4, ACF/VTAM 2.1/2.2/3.0, NPM (Network Performance Monitor), and EREP 3.0 • supports the following programs running on the 3725: EP for IBM 3725 1.2, NTO 3.0, NRF 1.2 (MVS only), and X.25 NPSI 1.4.2 • can communicate with ACF/NCP levels ACF 2.0 (on 3705 and 3725) and ACF 3.0 (3705 and 3725) • sessions between ACF/VTAM 3.0 and ACF/VTAME, ACF/VTAM 1.0, or ACF/NCP 1.1/1.2/1.3 are not supported directly or through a gateway NCP; sessions between ACF/VTAM 3.0 and ACF/NCP 1.2.1 are supported only through a link-attached NCP 3.0 gateway in a separate network • customers may continue to order ACF/NCP 1.2.1/1.3.0 (for 3705) and ACF/NCP V 2.0/3.0 (for 3705/3725) • availability of ACF/NCP 4.0 planned for third quarter 1985 for MVS users and fourth quarter 1985 for VSE users:

1,950/1,755	650/585	135/216

Partitioned Emulation Programming (PEP) Extension • allows ACF/NCP for 3725 to operate in NCP mode as well as in 2701/2702/2703 emulation mode; thus it allows concurrent execution of older applications from emulated systems with newer NCP applications • requires EP/3725 as well as ACF/NCP for 3725.

EP Software

5735-XXB Emulation Program for 3725 (EP/3725) 1.0 • allows IBM 3725 channel attached to IBM S/370-compatible host to perform most functions of IBM 2701 Data Adapter Unit with an IBM 2702 or 2703 control unit; operates only on 3725 and not on either the 3704 or 3705 but offers equivalent functions to those provided by EP for 3705 as well as additional functions • supports 6 channel adapters; contains enhanced performance evaluation tools and enhanced error recording and notification; improves availability by continuing operation with controlled shutdown when failures occur; incorporates S.W.I.F.T. PRPQ (5799-AQT) to assist EP or PEP users to attach to SWIFT network; supports IBM 3101 Display Terminal at 1200 bps over switched or nonswitched lines; and supports EP/3725 in VM/SP 2.1 under CMS with ACF/SSP V2 R1.1 • host access methods that support EP for the IBM 3705 will also support EP/3725; these include BTAM, BTAM-ES, BTAM-SP, ACF/TCAM, and RTAM • requires ACF/SSP V2 R1.1 running on S/370-compatible host for system generation; host system must run under VSE/AF R3, OS/VS1 R7, VM/SP R2.1, MVS/370 (R3.8, R3.8 with System Extension, or R3.8 with SP V1), or MVS/XA • can run as standalone system or with ACF/NCP Version 2 for 3725 to provide PEP extension to NCP • some source modules are designated "RESTRICTED MATERIALS OF IBM" and other modules are available in object code only • available fourth quarter 1983:

$1,280/$963 initl	$240/$180 mo	$37/$59 serv

EP/3725 2.0 • provides same features as 1.0 with enhanced capability; enhances start/stop performance, supports BSC tributary normal mode capability of 3725, and provides compatibility with ACF/NCP 3.0 • availability June 29, 1984:

1,200/900	225/169	35/56

☐ Program Development/Languages

5735-XXA ACF/System Support Programs (ACF/SSP)

ACF/SSP 2.1.1 • provides generation and utility functions for ACF/NCP 2.0, ACF/NCP 2.0 for IBM 3725, Emulation Program (EP) for IBM 3725, 3705-II, and 3705-80, and PEP extension to NCP for both 3725 and 3705 • includes same features as those offered with ACF/SSP 1.0: assembler, load, dump, and dynamic dump utilities, and ACF Trace Analysis Program • in addition, provides reduced system generation time for ACF/NCP 2.0 for 3725 by eliminating conditional assemblies • includes standalone configuration report program that gives the user a detailed report on resources and resource attributes of the network, separating SNA devices from non-SNA devices; report can include resource level, resource name, network address (actual and one specified on macro), control unit type, physical unit type (for SNA devices), data mode (half- or full-duplex for SNA devices), line type (half- or full-duplex), line speed, resource type (NCP, EP, or PEP for non-SNA devices), subarea devices (SNA devices), clocking (internal or external), line control (user or SDLC for SNA devices and BSC or S/S for non-SNA devices), dial (yes/no), dial number (for non-SNA devices), other characteristics (virtual or real status, NRZ or NRZI encoding, PUDRPOOL, LUDRPOOL, LUPOOL, NCPNAU, and service order for SNA devices), and comments/notes • user can tailor report to configuration • designed to operate with 1 locally attached IBM 3705 or 3725 system with storage for the appropriate ACF/NCP 2.0 operating system • runs on an S/370-compatible host

INITL: first figure is initial charge for primary system; second figure is for distributed system (DSLO). MO: first figure is monthly license charge for primary system; second figure is for distributed system (DSLO). SERV: first figure is monthly service charge for a single system (MLPSC); second figure is for multiple systems (MMLPSC). All prices effective as of September 10, 1984.

©1984 Data Decisions

IBM 3725 Series Communication Controllers
3725 Models 1 & 2

running under VSE/AF 3.0, OS/VS1 1.7, MVS/370 (3.8, 3.8 with System Extension or 3.8 with SP 1.0), or MVS/XA • some source modules are designated "RESTRICTED MATERIALS OF IBM" and other modules available only in object code • available fourth quarter 1983:

$420/$315 initl	$76/$57 mo	$22/$35 serv

ACF/SSP 3.0 • includes all features and facilities of ACF/SSP 2.1.1 • supports users of ACF/NCP 3.0 and EP for 3705 and 3725; supports users of ACF/NCP 4.0 and supports IBM 3710 Network Controllers • allows users to reduce generation time via new NCP/EP definition facility (NDF), which also provides usability enhancements for generation • includes configuration control program, providing capability for defining, displaying, and modifying configuration for IBM 3710 Network controller and its attached devices in an SNA network; also allows definition of X.25 protocols between IBM 3725 and IBM 3710 support, in addition to SNA/SDLC communication • runs in virtual storage environment in any IBM configuration that supports MVS/370, MVS/XA, VM/SP 1.4, VM/SP HPO 1.4, VSE/AF 2.1, or VSE/SP 2.1.

5665-338 ACF/SSP 3.0 for MVS/370 & MVS/XA • planned availability is second quarter 1985:

1,500/1,125	500/375	65/104

5664-289 ACF/SSP 3.0 for VM/370 • planned availability is third quarter 1985:

900/675	300/225	40/64

5666-322 ACF/SSP 3.0 for VSE • planned availability is fourth quarter 1985:

300/225	100/75	25/40

☐ Other Facilities

5668-963 Network Routing Facility (NRF) • designed to provide ACF/NCP/VS users with a message-routing facility; resides in communication processor and routes messages between various devices with using host facilities.

5668-963 NRF R1 • designed for use with IBM 3705; limited to routing among up to 255 logical units (LUs).

5668-963 Network Routing Facilities (NRF) R1.5 • required for operating with ACF/NCP V3; supports both IBM 3705 and 3725; removes restriction of a maximum of 255 LUs (logical units) supported by NRF R1; can define 255 PUs (physical units) per line and 255 LUs per PU; can route to/from CICS/VS host application using IBM 3650 Pipeline Logical Unit (LU); can also route between terminals in different subareas, i.e., attached to different NCPs • allows forced deactivation of SNA resources being routed through NRF R1.5; reduces buffer-size requirement from 92 to 72 bytes to match ACF/NCP V3 minimum buffer size; can provide information on virtual routes (VRs), explicit routes (ERs), and subareas between LUs to the NLDM R2 • requires ACF/NCP V3, NTO R2.1, if routing messages to 3780 BSC devices, and ACF/VTAM V2R2 if NLDM R2 is required • NRF R1 is upward compatible with NRF R1.5 except a new NRF PU macro must be coded (needed to remove 255 LUs restriction) • requires about 30K bytes of storage on 3705/3725 for static control blocks and modules; additional storage required for each LU, routing-related tables, user-exit routines and control, and NTO R2.1 when used • available March 1984 for 3705 and June 1984 for 3725:

$3,205/$2,405 initl	$1,070/$803 mo	$226/$362 serv

NRF Release 2 • designed to operate with ACF/NCP 4.0; includes facilities of previous releases plus it provides extended network addressing, timeout delay processing, and serviceability enhancements • extends addressing from 16 bits to 23 bits: 8 bits for 255 subarea addresses and 15 bits for 32K element addresses within subarea • timeout delays allow synchronizing timeouts between NRF 2.0 and session partners; NRF will wait a user-specified time interval before purging a message from its queue giving the session partner time to adjust its queue • NRF 2.0 control blocks are formatted with NCP control blocks allowing identification of them within NCP dump; NRF generation data and timer trace records provide information aid in debugging and control • requires ACF/NCP 4.0 and NTO 3.0 if messages are to be routed to 3780 BSC devices; rest of software is that needed by ACF/NCP 4.0; designed to operate with MVS/370 and MVS/XA on host • available third quarter 1985:

3,525/2,644	1,175/881	248/392

5668-981 X.25 NCP Packet Switching Interface (NPSI) 1.4.0 • provides same functional support as in Release 3.1 for use with ACF/NCP 2.0 for 3705 except Release 4 link access support is LAPB (link access procedure balanced) only • in addition, 1.4 supports NPDA 2.0 • significant features include subset of X.25 services conforming to CCITT Recommendation X.25 (Geneva, November 1980): permanent virtual circuit/virtual call management; Modulo 8 and Modulo 128 packet sequence numbering; packet length selection up to 4096 characters; and LAPB support • SNA communication over X.25 networks to selected SNA devices through Network Interface Adapter (RPQ 5973-L02) • control facilities to allow user to provide PAD support at application program level for HDLC and BSC protocol connections • integrated support for subset of CCITT Recommendation X.29 to allow communication with terminals conforming to Recommendation X.28, such as TTY 33/35 • allows a host application to manage X.25 control functions • supports IBM licensed program subsystems, such as CICS/VS, IMS/VS, TSO, VSPC, NCCF, and NPDA • allows connection of SNA nodes (running ACF/NCP) through X.25 networks • supports 1200- to 56K-bps lines, IBM cryptographic subsystem/access products, and selected user facilities:

700/525	223/166	30/48

5668-981 X.25 NPSI 1.3.2 • supports ACF/NCP 3.0 for 3705 in MVS or VSE environments; supports functions of previous releases plus the ACF/NCP 3.0 force deactivation of X.25 links and extension of key control blocks above 64K boundary • available September 30, 1984, for MVS environment and first quarter 1986 for VSE environment:

770/577	269/202	40/64

5668-981 X.25 NPSI 1.4.1 • supports ACF/NCP 3.0 for 3725 in MVS environment; same functions as X.25 NPSI 1.4 functions including ACF/NCP 3.0 force deactivation of X.25 links • available December 28, 1984, for MVS environment:

770/577	269/202	40/64

5668-981 X.25 NPSI 1.4.2 • supports ACF/NCP 4.0 in MVS and all X.25 NPSI 1.4.1 functions; supports extended network addressing, IBM 3725-initiated wraptest of X.25 links, and IBM 3710 Network Controller; allows IBM 3710 to communicate with SNA host across X.25 networks • available third quarter 1985 for MVS environment and fourth quarter 1985 for VSE environment:

770/577	269/202	40/64

5735-XX7 Network Terminal Option (NTO) 1.2 for the 3725 • extends ACF/NCP 2.0 for the 3725 to allow non-SNA terminals access to SNA through the record mode application program interface in ACF/VTAM 1.3 (MVS only) or ACF/VTAM 2.0, or ACF/TCAM 2.4 by appearing to be SDLC 3767 Communications Terminals • supports 2740 Model 1 and 2741 on switched or dedicated connections, TWX Model 33/35 on switched connection, and WTTY on dedicated connections:

600/450	171/127	16/25

NTO Release 2.1 • allows forced deactivation of non-SNA lines attached to non-SNA terminals supported by NTO 2.1; all ABENDs have unique identification codes • available June 29, 1984 • runs on both 3705 and 3725 • IBM plans no further enhancements to NTO for OS/VS1 but will continue to enhance NTO in VSE environment • operates with ACF/NCP 3.0 only; ACF/NCP 3.0 determines other software requirements:

600/400	188/141	11/18

NTO Release 3 (3.0) • for 3725 only for use in MVS/370.2, MVS/XA, and VSE environments; designed to operate with ACF/NCP 4.0; extends network addressing and serviceability; and enhances performance • extends network addressing from 16 bits to 23 bits, allowing 255 subareas and 32K elements per subarea to be defined in a single network • formatted NTO control blocks displayed in NCP dump for problem determination • NTO control points, inputs, and outputs are recorded in internal storage trace tables for problem determination • performance improved by reducing NTO mainline path length • scheduled availability is

 ©**1984 Data Decisions**

IBM 3725 Series Communication Controllers
3725 Models 1 & 2

third quarter 1985 for MVS and fourth quarter 1985 for VSE users:

660/495	205/155	12/19

5662-262 Teleprocessing Network Simulator (TPNS) V2R2 • a telecommunication testing package that can simulate a complete specified network, including X.25 network, and its message traffic without the use of terminals; can test and evaluate application programs, access methods, and control programs; can stress test application programs with volume messages to evaluate their reliability and performance under operating conditions • runs on host processor under OS/VS1, MVS, and MVS/XA; requires minimum virtual region size of 704K • requires 2 communication controllers: one running a TPNS control program during the simulation run and the other running the application of system under test; TPNS 3725 requires a 3725 channel adapter, 3725 communication scanner, sufficient line adapters to simulate the line configuration required, and loader and dump utilities in SSPV2R1.1 (5735-XXA) • TPNS control program for 3725 supplied with 5662-262 • functionally equivalent to TPNS for 3705:

NA/NA	1,705/NA	NA/NA

■ HARDWARE

☐ Terms & Support

Terms • the 3725 Communications Controllers are currently available under Plan D on a purchase or 30-day rental basis • IBM allows up to 65% of first 6 months' rental charges to be accrued towards purchase.

Support • 3725 marketed and supported through nationwide network of local IBM offices • maintenance bundled into rental and lease charges, and extra for purchased units; basic monthly maintenance charges cited in text for purchased equipment only, with availability on 9 consecutive hours, 7:00 AM to 6:00 PM, Monday through Friday basis; extended service for weekends or before/after standard hours at premiums over basic rate cited; full, 24-hour, 7-day service adds 47% premium to fees • initial period of maintenance is 3 months.

☐ Overview

IBM 3725 controllers are programmable, communications processors that are not software compatible with earlier 3704 and 3705 models. They can, however, coreside compatibly on SNA networks with 3705 processors running ACF/NCP 2.0 or 3.0 for the 3705. The 3725 was designed to assume some communications overhead of a host processor in addition to performing control and message processing functions.

Data communications functions handled by 3725 under program control include polling and addressing; data link control; line error recovery; dynamic buffer control; character code translation; line control; control character recognition; line timeout; character assembly/disassembly; error checking and recovery; and time and date stamping. In addition to performing local front-end processing for a single host, the 3725 can also operate in multihost, shared, front-end processing configurations or remote communications concentrators. In multisystem SNA network environment, the 3725 can function as an intermediate network node. In multinetwork environments, the 3725 acts as a gateway between SNA networks and between SNA and X.25 Packet Switching Networks.

3725 Configurations • support communication tasks for up to 6 channel-attached host processors simultaneously; also support remote line concentrator operations and front-end processor-to-processor network communications • support up to 256 half- or full-duplex asynchronous/synchronous lines at 50 bps to 230.4K bps; lower line attachment limits for high-speed lines • RPQs are available for Very High-Speed Lines to interconnect 3725s; line speeds are 512K to 1.544M bps.

The 3725 can accommodate up to 8 channel adapters to selector, byte multiplexer, or block multiplexer channels on S/370-compatible hosts. The channels can be connected to the same or different hosts. Only 6 channels can operate simultaneously. One or 2 2-processor switches can be installed to switch connection of 2 channel adapters between 2 host I/O channels. The switch is manually operated.

Basic hardware modules of the 3725 consist of a Central Control Unit (CCU), Main Storage, Maintenance and Operator Subsystem (MOSS), and Transmission Subsystem (TSS).

The CCU executes the instructions to control the communications scanners and channel adapters. It runs under the ACF/NCP V2, EP/3725, or both in PEP mode.

Main storage consists of 512K bytes for Model 2 or 512K/768K/1M bytes for Model 1. It stores the executing program loaded from the S/370-compatible host and provides buffers for data exchanges between communication lines and channel adapters.

MOSS is an independent processor with its microcode providing IPL and utility functions for the 3725 operator. It includes a diskette drive and attachment for the IBM 3727 operator console. The 3727 includes a logic unit, keyboard, and display designed to install, operate, and maintain the 3725. A 3725 requires a primary IBM 3727 operator console for maintenance; an alternate console can be located up to 490 feet from the 3725. A primary 3727 can be shared among up to 4 IBM 3725s while an alternate 3727 can be shared by up to 5 IBM 3725s. The operator console provides access to MOSS functions and gives operator guidance.

The TSS provides the physical connection to the communication facilities. It contains Line Attachment Bases (LABs) with microprocessor-based scanners, Line Interface Couplers (LICs), and optional Internal Clock Control (ICC) units. Integrated modems are unavailable with the 3725. The basic IBM 3725 Model 2 includes 1 LAB which contains 1 communication scanner and attaches up to 24 half- or full-duplex communication lines through up to 6 LICs. Model 2 also includes 1 ICC unit.

The basic IBM 3725 Model 1 includes 2 integral CLABs; each CLAB contains 1 communication scanner and supports up to 32 half- or full-duplex lines through up to 8 LICs. The basic Model 1 can attach 1 additional LAB for connection of up to 32 half- or full-duplex lines through up to 8 LICs for a maximum of 96 lines.

An IBM 3726 Communication Controller Expansion Unit can expand the capacity of Model 1 to 256 half- or full-duplex lines through installation of up to 5 additional LABs and up to 40 additional LICs. The base 3726 system supplies space for up to 3 LABs and up to 96 lines; an optional Line Increase Feature expands line capacity with 2 LABs and up to 64 lines.

The basic IBM 3725 Model 2 can support 2 Channel Adapters for connection to a byte multiplexer, block multiplexer, or selector channel on an S/370-compatible host. The Model 2 does not allow installation of 2-processor switches, thus it cannot be switched between host processor channels.

The basic IBM 3725 Model 1 supports 2 channel adapters which can be connected to the same host or to 2 different hosts. A 2-processor switch can be installed with each channel adapter to switch it between 2 channels on the same host or on 2 different hosts. The IBM 3726 Expansion allows connection of up to 6 channel adapters connected to channels on the same host or on multiple hosts or up to 4 channel adapters with 2 connected through 2-processor switches to up to 6 channels on the same host or on multiple hosts.

Four types of LABs are available: the CLAB included with the basic IBM 3725 Model 1, LAB Type A, LAB Type B, and LAB included with Model 2: Types A and B differ in that Type A LABs (as well as CLABs) and the standard LAB in Model 2 contain 1 Communication Scanner while Type B LABs contain 2 communication scanners.

The scanner serializes and deserializes the data, handles various line protocols, buffers characters, and transfers data into the 3725 main storage in a cycle stealing mode. The scanner can handle BSC (EBCDIC, ASCII) and SDLC transmissions in normal mode, which is similar to that of the 3705 Scanner Type 3. It can also handle asynchronous protocols with 5 to 8 data bits and/or 2 stop bits in character mode, similar to 3705 Scanner Type 2. The scanner also supports BSC in character mode, required for tributary addressing under EP or PEP. The scanner also supports automatic calling unit procedures and X.21 native, X.21 bis, and

©1984 Data Decisions

IBM 3725 Series Communication Controllers
3725 Models 1 & 2

X.20 bis. The number of lines it can handle depends on the protocols used and the transmission speed.

Line interface couplers (LICs) allow direct attachment of DTEs to the 3725 at line speeds up to 1200 bps for asynchronous transmission and up to 56K bps for synchronous transmission. Half- or full-duplex transmission rates over modem-attached lines range from 1200 bps to 64K bps using BSC protocol and from 4800 bps to 230.4K bps using SDLC procedures. The number of lines per LIC and number of LICs per LAB varies depending on protocol and transmission speed. For example, a LAB can connect up to 32 lines through 8 LICs for SDLC protocol and transmission speeds up to 9600 bps. A LAB, however, can support only 1 LIC if it connects 1 SDLC, 230.4K-bps half- or full-duplex line.

☐ CPU & Memory

The basic IBM 3725 includes central control unit (CCU), 512K-byte main memory, maintenance and operator subsystem (MOSS), and transmission subsystem (TSS). The performance of the 3725 is roughly twice that of the 3705-II. Depending on line speed and protocols supported, a 3725 can accommodate 1.8 to 3.5 times as many comparable lines as a 3705-II. The 3725 is easier to configure than the 3705-II. Also, the MOSS on the 3725 is new and provides maintenance and control features unavailable for the 3705-II, such as an operator console, problem determination facilities, and IPL capability.

IBM 3725 Model 1 • includes CCU with 512K-byte memory, MOSS, TSS, and 2 CLABs; each CLAB includes 1 communication scanner and can attach up to 32 half- or full-duplex communication lines through 8 optional line interface couplers (LICs) • the basic model can include 2 channel adapters, 2 2-processor switches (TPSs), 1 additional LAB, up to 2 256K-byte storage increments, and 1 IBM 3726 Communication Controller Expansion • requires use of 1 primary IBM 3727 operator console:

$3,485 mo	$75,000 prch	$213 maint

7100 Storage Increment (256K Bytes) • 6 maximum per 3725:

203	4,375	19

IBM 3726 Communication Controller Expansion • for 3725-1 only • provides additional line and/or channel attachment to basic system; expands capability of 3725-1 by providing physical attachment for up to 4 channel adapters without 2 processor switches (TPSs) or for up to 2 channel adapters with TPSs and for up to 5 LABs for connecting up to 160 lines • supports a line increase feature to attach 2 additional LABs to connect up to 32 lines each through optional LICs:

1,485	32,000	40

3602 Line Increase Feature • allows installation of the 7th and 8th LAB in the IBM 3726:

395	8,500	14

4666 Internal Clock Control (ICC) • provides bit clocking when the external DCE does not provide clocking or when DTE is directly attached; provides clocking for up to 8 LICs (32 lines) at 50, 110, 134.5, 200, 300, 600, and 1200 bps with or without a DCE and at 2400, 4800, 9600, 19.2K, and 56K bps for directly connected DTEs • maximum 2 per base 3725-1, plus 1 per LAB Type A or B in 3725-1 or 3726:

69	1,500	2

IBM 3725 Model 2 • includes CCU with 512K-byte memory, MOSS, TSS, and 1 standard LAB; the LAB includes 1 communication scanner and can support up to 24 half- or full-duplex communication lines through 6 optional line interface couplers (LICs) • the basic model can include 2 channel adapters; neither can support a 2-processor switch (TPS):

2,630	60,500	190

IBM 3727 Model 70 Operator Console • provides operator interface to the Maintenance and Operator Subsystem (MOSS) of IBM 3725; 1 primary console is required for installation, operation, and maintenance of 3725 • includes logic unit, display feature, and keyboard feature • the screen is organized in functional areas: current machine status on first 3 lines, menus and operation options in central region with alarms, messages, and operator information on last 2 lines • 8 keys control cursor; 3 editing keys: insert character, delete character, and erase • the primary console is located within 25 feet of the 3725; a second, alternate console can be located up to 490 feet from the 3725; only 1 3727 can be active at a time and the active 3727 is switch selected on the 3725 control panel • high-level language provided to execute control program procedures:

171	2,390	27

3255 Display • displays up to 1920 characters in 20 rows of 80 characters each; forms characters via 7x14 dot matrix; displays 70 graphic characters, 26 uppercase alphabetics, 10 numerics, 33 special characters, and space:

NA	325	NA

4655 Keyboard • movable keyboard with alphabetic keyboard, 12-key numeric pad, 5 function keys, and 3 special keys:

NA	420	NA

7427 Console Switching Unit • special RPQ (8J5008) that allows up to 4 IBM 3725s to share a single primary operator console or up to 6 IBM 3725s to share an alternate operator console.

4667 Internal Clock Control (ICC) 2 • second clock for both 3725 models; supports internally clocked asynchronous terminals for operation with/without modems for operation as 75/100/2400/4800/9600/19.2K bps in addition to currently supported speed; also supports synchronous devices (typically 3705s or other 3725s) at 245,760 bps; available third quarter 1985:

69	1,500	2

Upgrades

IBM 3725 Model 2 to Model 1 • can be converted in the field:

NA mo	$16,000 prch	NA maint

☐ I/O Channels

The IBM 3725 interfaces to local S/370-compatible host processors through up to 2 (3725-1 base system and 3725-2) or 8 (3725-1 plus 3726 Expansion) channel adapters. The first and second channel adapter positions in the 3725-1 base system and the third and fourth channel adapter positions in the 3726 expansion unit can support 2-processor switches (TPSs). If 2-processor switches are not installed with channel adapter positions 3 and 4, then 2 more channel adapters can be installed in positions 5 and 6. Thus, the 3725-1 combined with the 3726 can connect up to 6 channel adapters, which can connect to up to 8 host processors, but only 6 can operate simultaneously.

Channel adapters connect to byte multiplexer, block multiplexer, or selector channels on the same or different IBM S/370-compatible hosts.

1561 Channel Adapter • provides physical connection to host I/O channels from 3725-1, 3725-2, and 3726:

$315 mo	$6,750 prch	$8 maint

8320 2-Processor Switch • manual switch for use with channel adapters on 3725-1 and 3726 • connects channel adapter to 2 channels on the same host or on different hosts:

187	4,000	3

8J5080 Very High-Speed Adapter (VHSA) RPQ • for 3725-1 only; supports line speed of 1.544M bps • attaches a nonswitched line for full-duplex or half-duplex communication between IBM 3725s under control of ACF/NCP (SNA/SDLC) • available third quarter 1985:

NA	35,200	33

8J5081 VHSA RPQ • for 3725-1 only; differs from 8J5080 in that it supports line speed of 1.024M bps:

NA	32,400	31

MO: monthly rental charge; includes maintenance. PRCH: purchase price. MAINT: monthly maintenance charge for purchased systems. NA: not available/applicable. All prices effective as of September 10, 1984.

©1984 Data Decisions

IBM 3725 Series Communication Controllers
3725 Models 1 & 2

8J5082 VHSA RPQ • for 3725-1 only; differs from 8J5080 in that it supports line speed of 512K bps:

NA	32,400	31

☐ Communication Lines

Communication lines connect to an IBM 3725 through Line Interface Couplers (LICs) attached to Line Attachment Bases (LABs). The 3725 uses 5 types of LABs: the 2 integral LABs called CLABs (Channel and Line Attachment Bases) in the base IBM 3725-1, LAB Type A, LAB Type B, the integral standard LAB in the 3725-2, and the optional CLAB for 3725-2. All LABs include 1 or 2 communication scanners.

Each Model 1 CLAB includes 1 communication scanner and supports up to 32 communication lines through up to 8 Line Interface Couplers (LICs). The integral LAB on the 3725-2 includes 1 communication scanner and can connect up to 24 communication lines through up to 6 LICs.

The 3725-2 can attach an optional CLAB with a microprocessor-based communication scanner and a physical base for up to 24 line attachments (through up to 6 LICs), up to 2 additional channel adapters, and 1 internal clock control (ICC). The 3725-2 can also attach 1 LAB A or LAB 2 for attachment of up to 32 additional line attachments and 1 ICC. The optional CLAB or LAB can attach up to 14 LICs. New expandability of 3725-2 available September 30, 1985.

The LAB Types A and B are used to add line capacity to the base 3725-1 or -2 and to the 3726 expansion unit. The LAB Type A includes 1 communication scanner and accommodates 32 lines through 8 LICs. The LAB Type B includes 2 communication scanners and connects up to 32 lines through 8 LICs. The sum of the LIC weights cannot exceed 100 for any communication scanner. The LIC weights are based on line speed: the higher the data rate, the larger the weight. Thus, the number of lines a scanner can support is a function of the line speeds.

4771 LAB Type A • expands line capacity of 3725-1/-2 or 3726; includes communication scanner and physical base for up to 8 LICs Type 1 (4911) or Type 4A (4941) for 3725; the sum of the LIC weights cannot exceed 100 for the scanner:

$882 mo	$19,000 prch	$16 maint

4772 LAB Type B • expands line capacity of 3725-1/-2 or 3726; includes 2 communication scanners and physical base for up to 8 LICs Type 1 (4911), Type 2 (4921), Type 3 (4931), Type 4A (4941), or Type 4B (4942); each scanner can support up to 4 LICs; the sum of the LIC weights cannot exceed 100 for each scanner:

1,230	26,400	27

4773 CLAB for 3725-2 • includes a microprocessor-based communication scanner and a physical base for up to 24 additional line attachments, 2 additional channel adapters, and 1 internal control clock (ICC); can attach up to 6 LICs; sum of LIC weights cannot exceed 100 for scanner • available September 30, 1985:

929	16,000	25

Line Interface Couplers (LICs)

IBM provides 5 types of LICs to connect DTEs to the 3725: LIC Type 1 (LIC-1), LIC Type 2 (LIC-2), LIC Type 3 (LIC-3), LIC Type 4A (LIC-4A), and LIC Type 4B (LIC-4B). All the LICs except LIC-2 can connect a DTE locally to 3725 or remotely through communication links. A LIC connects from 1 to 4 half- or full-duplex lines to a LAB.

4911 Line Interface Coupler (LIC) Type 1 • provides 4 EIA RS-232C/CCITT V.24 interface ports for half- or full-duplex communication lines at up to 19.2K bps; provides direct (modemless) connection of synchronous DTEs at 2400/4800/9600/19.2K bps if associated with integral clock control (ICC) and if externally clocked start/stop DTEs at 2400/4800/9600 bps • all directly connected DTEs must operate at same speed; lines connected through modems can operate at different speeds • each port can support EIA RS-366/CCITT V.25 Autocall Equipment, or an X.21 bis or X.20 bis interface • can handle BSC or SDLC or asynchronous start/stop protocols; data rates above 9600 bps limit a scanner to only 2/4 (fourth quarter 1985) LIC-1s • requires an integral LAB or CLAB in base system or LAB Type A or B in a line expansion position of 3725 or 3726:

$123 mo	$2,600 prch	$2 maint

4921 Line Interface Coupler Type 2 (LIC-2) • accommodates a single half- or full-duplex communication line at transmission rates up to 230.4K bps; includes digital interface to attach dedicated wideband service, type 8751, 8801, or 8803 • when LIC-2 is installed on a scanner, it can support up to a maximum of 4 LICs for data rates up to 64K bps; if line speed is 230.4K bps, a scanner can support only 1 LIC • supports BSC and SDLC protocols:

139	3,000	2

4931 Line Interface Coupler Type 3 (LIC-3) • accommodates a single half- or full-duplex dedicated communication line via V.35 interface at data rates to 256K bps; provides direct (modemless) connection at data rates up to 56K bps; if it is associated with an ICC • when LIC-3 is installed on a scanner, it can support a maximum of 4 LICs • supports BSC and SDLC protocols:

139	3,000	2

4941 Line Interface Coupler Type 4A (LIC-4A) • provides 4 CCITT X.21 interface ports as defined in IBM SRL GA27-3287 for half- or full-duplex, switched or dedicated communication lines at data rates up to 9600 bps; physical interface conforms to CCITT V.11 Recommendation • provides direct (modemless) attachment at 2400/4800/9600-bps data rates if it is associated with an ICC • supports only SDLC protocol:

123	2,600	2

4942 Line Interface Coupler Type 4B (LIC-4B) • single CCITT X.21 interface port as defined in IBM SRL GA27-3287 for a half- or full-duplex switched or dedicated line; supports data rates up to 48K bps on switched line and 64K bps on dedicated line; provides direct (modemless) connection at data rates up to 56K bps; requires ICC • supports only SDLC protocol • when LIC-4B is installed on a scanner, it can support a maximum of 4 LICs:

139	3,000	2

• END

©1984 Data Decisions

IBM 3770 Series Data Communication Systems
Models 3771, 3774, 3775, 3776 & 3777

■ PROFILE

Function • user-programmable (3774/3775) or nonprogrammable (3771/3776/3777) off-/online batch and interactive terminal series; supports local and distributed mode, data entry, inquiry and RJE tasks.

Architectures Supported • attaches via data adapters or 3704, 3705, or 3725 communications controller to S/370, 303X, 4300 hosts in BSC or SNA/SDLC distributed architectures in point-to-point or multipoint configurations • 2770-/3780-type BSC operation supported on all models except 3776 M3 and M4, and 3777 M3 and M4; S/360 M20-5 BSC multileaving on 3777 M2 • SNA/SDLC operation supported on all models except 3777 M2; LU1-type terminal.

Communications • for host DOS/VS environments, under CICS/VS, BTAM, VTAM and NCP/EP/VS for BSC, and CICS/VS, VTAM, ACF/VTAM, and ACF/NCP/VS for SDLC • for host OS/VS1 environments, under CICS/VS, IMS/VS, BTAM, VTAM, TCAM, and NCP/EP/VS for BSC, and CICS/VS, IMS/VS, TCAM, BTAM, ACF/TCAM, ACF/VTAM, and ACF/NCP/VS for SDLC • for host OS/VS2 environments, under CICS/VS, IMS/VS, TCAM, VTAM, and NCP/EP/VS for BSC, and CICS/VS, IMS/VS, BTAM, TCAM, VTAM, ACF/TCAM, ACF/VTAM, and ACF/NCP/VS • single-line, half-/full-duplex, 1200/2400/4800 bps (3771/3774/3775/3776) or 2400/4800/7200/19.2K bps (3776/3777) BSC/SDLC.

Operating System • augmented subset of 3790 programming statements assembled on host (3774/3775).

Database Management • none; only in association with host IMS or CICS facilities in distributed architectures.

Transaction Processing Management • distributed through host CICS or IMS which acts as terminal-oriented transaction monitor with file processing facilities • supports send and receive, batch and inquiry tasks.

Support Software • supported by host/network batch and interactive systems software facilities • host/network assembler, instruction and macro facilities for data entry/inquiry/RJE task programs (3774/3775).

Processor • up to 22K-byte memory (3774/3775) • primarily buffers augmented with diskette on some nonprogrammable models.

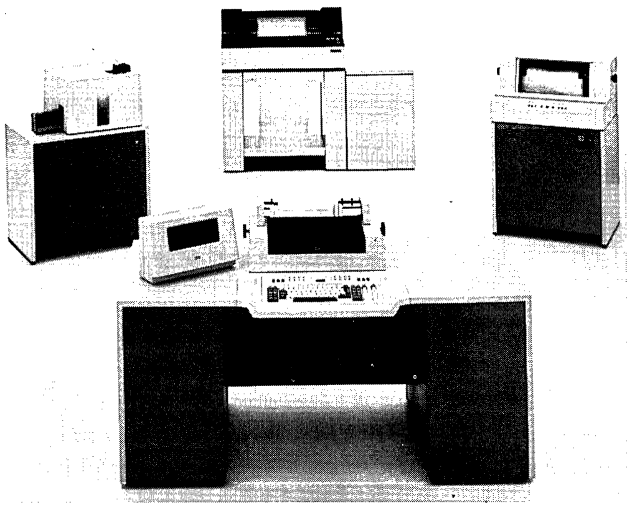
Terminals/Workstations • single keyboard console terminal with diskette, mag tape, printer, display, and/or tab card peripherals.

First Delivery • 1974 (3771/3774/3775); 1975 (3776/3777).

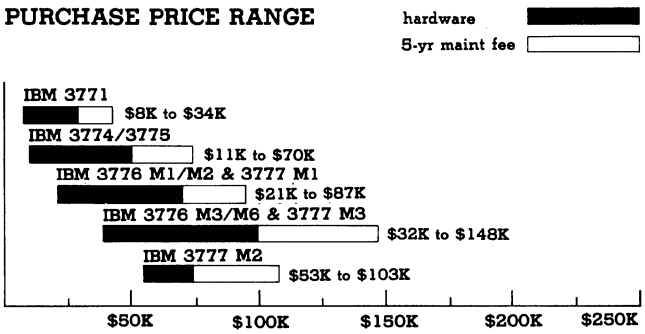
Systems Delivered • unknown.

Comparable Systems • a number of manufacturers offer batch terminals or systems that are competitive with members of the 3770 family; among the better known are Harris, Telex, Northern Telecom (Data 100), Inforex, Nixdorf, Decision Data, and GE Data Communications Products • in addition, a vast array of intelligent terminals, personal computers, or small-to-medium computer systems also offer emulations for RJE tasks that approximate 3770 operations.

Vendor • International Business Machines (IBM) Corporation, Information Systems Group • National Accounts Division; 1133 Westchester Avenue, White Plains, NY 10604; 914-696-1900 • National Marketing Division; 4111 Northside Parkway, Atlanta, GA 30327; 404-238-2000.



PURCHASE PRICE RANGE



IBM 3770 PURCHASE PRICE bar graphs cover price ranges between "small" and "large" configurations for hardware products (solid bars), and for associated 5-year period maintenance fees (open bars) • **IBM 3771 small configuration** consists of 3771 M1 40-cps keyboard-printer with BSC interface; large of 3771 M3 120-cps keyboard-printer with BSC/SDLC interface and 50-cpm card reader/punch • **IBM 3774/3775 small configuration** consists of 3774 P1 80-cps keyboard-printer with 6K-byte memory, 343K diskette storage and BSC interface; **large** of 3774 P2 120-cps keyboard-printer with 22K-byte memory, 586K diskette storage, display, 155-lpm printer, 50-cpm card reader/punch and BSC/SDLC interface • **IBM 3776 M1/M2 and 3777 M1 small configuration** consists of 3776 M1 300-lpm keyboard-printer with 243K diskette and BSC interface; **large** of 3777 M1 keyboard terminal with 486K diskette, 1200-lpm printer, 400-cpm card reader and BSC/SDLC 19.2K-bps interface • **IBM 3776 M3/M4 and 3777 M3 small configuration** consists of 3776 M3 300-lpm keyboard-display printer with 15K-byte command and 80K-byte message storage, 243K diskette storage, and SDLC 19.2K interface; **large** of 3777 M3 keyboard-display with 15K-byte command and 80K-byte message storage, 486K diskette storage, 12.5-ips tape drive, 1200-lpm printer, 400-cpm card reader, 50-cpm card punch, encrypt/decrypt, and SDLC 19.2K interface • **IBM 3777 M2 small configuration** consists of 3777 M2 keyboard terminal with 1000-lpm printer, 150-cpm card reader and BSC 19.2K interface; **large** of 3777 M2 with display, 1200-lpm printer, 400-cpm card reader, 50-cpm card punch and wideband 19.2K interface • all prices single-quantity purchase.

■ ANALYSIS

The 3770 series is approaching a decade on the market, and is a

 ©1985 Data Decisions

IBM 3770 Series Data Communication Systems
Models 3771, 3774, 3775, 3776 & 3777

mature product line that IBM continues to maintain. During the past year, IBM has made no enhancements to the product line, and only slightly changed the rental and maintenance fees (upward, of course).

The viability of systems like the 3770 is questionable when compared with the processing power available with personal computers. Those units offer very good operating systems, disk/diskette storage, extended main storage, and a plethora of software packages. The 3770, on the other hand, has limited main storage (up to 22K bytes), only a handful of applications packages, and program support only in assembler. On the plus side, the 3770 is well suited to batch and RJE applications where simple data entry and updating is the order of the day.

Still, for users satisfied by a system which handles batch/RJE plus some limited interactive processing, the 3770 has a lot to recommend it. All models support a card reader/punch; most accommodate diskette storage; and the 3776/3777 Models 3 and 4 allow attachment of a magnetic tape unit. The 3770's communication capabilities are also up-to-date with BSC and/or SDLC protocols supported; and the 3776/3777 provide multipaths which allow concurrent online/off-line operations in a multipoint environment.

Although it offers solid features, the local processing facilities are limited, as is software support. Most telling, however, is the lack of enhancements from IBM. Generally, that heralds the end of a product line.

☐ Strengths

The 3770 allows a variety of configurations which should serve the needs of batch/RJE installations not requiring a local application program development capability. The series offers a multiplicity of I/O options and may be configured to operate in a point-to-point and multipoint environment.

The 3776 and 3777 models incorporate some notable performance features. Both offer a dual data path which allows concurrent online and off-line operations in a multipoint environment and both permit online data stream interleaving via multiple logic unit (MLU) facilities of SNA/SDLC. BSC multileaving is supported on the 3777 Model 2.

Two other "strong" features are the data compression services and the data encryption capability available as an option on the 3776 Models 3 and 4 and 3777 Model 3. The former cuts the load on the data communications line by reducing the number of blank spaces transmitted; while the latter is critical when transmitting sensitive data.

Other factors to keep in mind when considering the 3770 family are the reputation it enjoys for high terminal and system reliability; and, of course, the strong local support IBM is noted for.

☐ Limitations

While the 3770 remains a viable competitor in the pure batch/RJE marketplace, its design is somewhat dated. Its terminal configurations are still firmware fixed as to function. Only 22K bytes of memory are provided on programmable models to handle all application programs and services; and all programming must be done in assembler language and macros, and compiled on the host.

We have mixed feelings about the requirement that all programming be done in assembler. On one hand, it does result in tightly compiled code (and you'll need it with those memory limitations) and should execute quickly. However, good assembler programmers are at a premium, and that could be an expensive extra in a 3770 shop.

If your needs aim you towards the 3775, you may be disappointed with the 120-lpm performance of the line printer. Unfortunately, IBM offers no faster printer for this system.

■ COMMUNICATIONS FACILITIES OVERVIEW

☐ Distributed Communications

Operation of the 3770 in distributed environments can be in 4 different modes. An online batch mode allows line-to-printer, line-to-card punch, line-to-diskette or line-to-magnetic tape input, and card reader-to-line, diskette-to-line or magnetic tape-to-line output. Online interactive modes support keyboard-to-line or line-to-printer operations. Concurrent dual data path online and off-line batch modes support line-to-printer with card reader-to-diskette, line-to-printer with diskette-to-card punch, or line-to-printer with diskette-to-diskette operations. Multi- and interleaved modes support BSC multileaving, or SNA/SDLC MLU interleaving. Not all modes of operation are available on each member of the 3770 Series.

3770 communications with the host are, with some model exceptions, in BSC, SDLC, or switch-selectable BSC/SDLC. At the host end, BSC attachment is either through an integrated communications adapter to the IBM S/370 Model 115 to 135; through a data adapter to the IBM S/370, 303X, or 4300; or through the IBM 3705 communications controller for the IBM S/370, 303X, or 4300. SDLC attachment is either through a communications adapter for the IBM 4331; or through the IBM 3705 communications controller for S/370, 303X, or 4300.

A multipoint feature allows most 3770 terminals to be multidropped on the same nonswitched line facility with other 3770s or compatible BSC terminals. The terminals only respond to their specific address when polled by the host. In such multipoint arrangements, SDLC may take advantage of full-duplex facilities to allow concurrent transmit/receive operations.

Host software environments support 2770-type BSC operations under DOS/VS, OS/VS1, OS/VS2(SVS), OS/VS2(MVS, MVS/SP) and VM/370/SP with associated access, database, and communications software. Environments that support 3780-type BSC operations include the same operating systems plus DOS/VSE. SNA/SDLC operations supported under host software environments of DOS/VS, DOS/VSE, OS/VS1, and OS/VS2 (MVS, MVS/SP).

☐ Distributed Configurations

The 3770 series consists of 14 different models, all of which may be used in a distributed environment.

3771 Models 1, 2 & 3 • nonprogrammable • interactive or batch operation • supports BSC and/or SDLC at up to 4800 bps • dual 256-byte buffers • 40/80/120-cps printer • tab card reader/punch.

3774 Models P1 & P2 & 3775 Model P1 • programmable or nonprogrammable • interactive or batch operation • supports BSC and/or SDLC to 4800 bps • 22K-byte memory; dual 256-/512-byte buffers • 100K/343K/586K-byte diskette storage • 480-character display • 80-/120-cps and 150-lpm printers • tab card reader/punch.

3776 Models 1 & 2 & 3777 Model 1 • nonprogrammable • RJE operation • supports BSC and/or SDLC to 4800 bps; 19.2K bps on 3777 M1 • 256-/512-byte buffers • 243K/483K diskette storage • 300/400/1200-lpm printer • tab card reader/punch.

3776 Models 3 & 4 & 3777 Models 3 & 4 • nonprogrammable • RJE and SNA/MLU operation • supports SDLC to 19.2K bps • 15K-byte definitions and 80K-byte message storage buffers • 243K/483K diskette storage; mag tape storage • 1024-character display • 300/400/1200-lpm printer • tab card reader/punch.

3777 Model 2 • nonprogrammable • IBM S/360 M20-5 MRJE operation • supports BSC to 19.2K bps • multileaving block buffer • diskette spooler/read-only storage • 1024-character display • 1000-lpm printer • tab card reader/punch.

☐ Distributed Communications Utilities

IBM supports the 3770 with host-maintained utilities for the maintenance of applications program libraries, and for the transmission of such programs to/from the terminal. In addition, a sort program allowing data sets to be sorted on the terminal rather than the host is also available.

■ SOFTWARE

☐ Terms & Support

Terms • programmable models of the 3770 family are supported

 ©1985 Data Decisions

IBM 3770 Series Data Communication Systems
Models 3771, 3774, 3775, 3776 & 3777

by FDP packages that incur fixed 12-month period monthly license charges • software fees cited in the text only relate to such program products or to packages used in 3770 program development; software costs associated with host processor operations in conjunction with 3770 terminals are not included.

Support • primarily central support via toll-free 800 number telephone consulting, with on-site backup assistance provided on an hourly basis.

☐ 3770 Programmability

3774 & 3775 Models • user-programmable employing subset of IBM 3790 programming statements with unique 3770 statements • programs assembled on IBM host processor but may reside in and be executed by 3774 or 3775 terminal • application programs may be written for off-line preparation of data or data entry with subsequent batch transmission to host with no direct connection between terminal program and host program • application programs may also be written for direct communications with host program for more program interactive environments • supervisor programs and BSC message headers or SNA function management headers may also be written either independent of or in conjunction with host programs.

Other 3770 Models & Nonprogrammable 3774 & 3775 Emulations • 3770 terminal job control settings allow operator definition of off-line or online job parameters or conditions via keyboard, card, or diskette input facilities; otherwise, the terminals are nonuser programmable.

☐ Host Software Environment

2770-Type BSC Operations

All 3770 terminals except the 3776 Models 3 and 4, and the 3777 Models 2, 3, and 4, may function in a 2770-type BSC mode under the following host system software.

DOS/VS • VTAM, BTAM, 3704/3705/3725 NCP/ES/VS access • CICS database and data communications facilities • POWER/VS RJE facilities.

OS/VS1 • VTAM, TCAM, BTAM, 3704/3705/3725 NCP/EP/VS access • IMS interactive database, and CICS database and data communications facilities • RES RJE facilities.

OS/VS2(SVS) • VTAM, TCAM, BTAM, 3704/3705/3725 NCP/EP/VS access • IMS interactive database, and CICS database and data communications facilities • HASP, ASP RJE facilities.

OS/VS2(MVS, MVS/SP) • VTAM, TCAM, BTAM, 3704/3705/3725 NCP/EP/VS access • IMS interactive database, and CICS database and data communications facilities • JES2, JES3 RJE facilities.

VM/370, VM/SP • RSCS RJE facilities.

3780-Type BSC Operations

Only the 3776 Models 1 and 2, and 3777 Model 1 may function in a 3780-type BSC mode under the following host system software.

DOS/VS, DOS/VSE • VTAM, BTAM, 3704/3705/3725 NCP/ES/VS access • CICS database and data communications facilities • POWER/VS RJE facilities.

OS/VS1 • VTAM, TCAM, BTAM, 3704/3705/3725 NCP/ES/VS access • CICS database and data communications facilities • RES RJE facilities.

OS/VS2(SVS) • VTAM, TCAM, BTAM, 3704/3705/3725 NCP/ES/VS access • CICS database and data communications facilities • HASP, ASP RJE facilities.

OS/VS2(MVS, MVS/SP) • VTAM, TCAM, BTAM, 3704/3705/3725 NCP/ES/VS access • CICS database and data communications facilities • JES2, JES3 RJE facilities.

VM/370, VM/SP • RSCS RJE facilities.

S/360 Model 20-5 BSC Multileaving Operations

The 3777 Model 2 functions in a BSC multileaving mode equivalent to an IBM S/360 Model 20-5 workstation under the following host system software.

OS/VS1 • RES RJE facilities.

OS/VS2 • HASP, ASP, JES2, JES3 RJE facilities.

VM • RSCS RJE facilities.

SNA/SDLC Operations

All 3770 terminals except the 3777 Model 2 may function in an SNA/SDLC mode under the following host system software.

DOS/VS, DOS/VSE • ACF/VTAM, 3704/3705/3725 ACF/NCP/VS access • CICS/VS database and data communications facilities; EXTM • POWER/VS RJE.

OS/VS1 • ACF/VTAM, ACF/TCAM, 3704/3705/3725 ACF/NCP/VS access • CICS/VS database and data communications; IMS/VS interactive database facilities • RES RJE facilities.

OS/VS2(MVS, MVS/SP) • ACF/VTAM, ACF/TCAM, 3704/3705/3725 ACF/NCP/VS access • CICS/VS database and data communications; IMS/VS interactive database • JES2 NJE, JES3 RJE facilities.

☐ Applications Development Aids

Host Programming Facilities • software for programmable 3774 and 3775 members of the 3770 family are prepared at a host processor using a host assembler, 3790 programming statements, unique 3770 statements, and an IBM-supplied, macro-instruction library • programs assembled are processed by host Program Validation Services (PVS) and then stored in host library for later transfer to 3770 terminal • macros and PVS support for 3774 and 3775 are packaged in 3790 Host Support SCP with program number 5747-BQ1 for DOS/VS environments, and 5744-BZ3 for OS/VS facilities.

3770 Supervisor Assembler • provides symbolic language and associated assembler code for 3770 programmable terminals • decodes and validates input data, builds table of addresses, and generates text cards • FDP requires DOS/VS, OS/VS1, SVS, MVS, or VM host support • program number is 5798-CWH • 12-month term:

$115 mo

3770/3790 Assembler Listing Post Editor • productivity aid to edit 3770/3790 assembler listings, improving readability and usefulness in debugging, tuning, and maintaining applications programs • FDP requires DOS/VS, SVS, MVS, OS/VS1, or VM host support • program number is 5798-CQZ • 12-month term:

81

3770/3790 PVS Data Test Support • productivity aid for 3770/3790 applications programmers used to simplify testing and reduce debugging time • generates VSAM file from user input data and control statements to simulate 3770/3790 data set in test operations • FDP requires DOS/VS or OS/VS host support • program number is 5798-CPG • 12-month term:

80

3770 Communications Utility • host program to maintain library of 3770 applications programs, and for the transfer of such programs to/from terminal • builds and maintains VSAM library from data set created by PVS program BQBLIBI • transmission through BTAM in BSC • FDP requires DOS/VS or OS/VS host support • program number is 5798-CKZ • 12-month term:

100

3770 Batch Transmission Services • host program to maintain library of 3770 applications programs, and for the transfer of such programs to/from terminal • provides all of the functions offered by 3770 Communications Utility plus SDLC support and other enhancements • requires DOS/VS or OS/VS host support • program number is 5798-CNX • 12-month term:

130

MO: monthly charge; charge applies for 12-month period. Prices are current as of December 1984.

 ©1985 Data Decisions

IBM 3770 Series Data Communication Systems
Models 3771, 3774, 3775, 3776 & 3777

3770 Sort Program • sorts 3770 user data sets on the terminal instead of the host processor • input is SORT key and reference to source date • ascending/descending sequences, using key lengths of 8, 16, 32, or 64 • FDP requires 3770 macros • program number is 5798-CNY • 12-month term:

80

POWER/VS 3777-2 Workstation Program • assembler-written program support for 3777 Model 2 operation in a DOS/VS POWER/VS environment • 3777 Model 2 is supported as an IBM 3780 with no modification of POWER/VS • program number is 5798-CXR • 12-month term:

80

■ HARDWARE

□ Terms & Support

Terms • the 3770 is available on a purchase, 30-day rental, or 2-year lease basis • IBM permits 45% to 50% of first-year rental charges to be accrued towards purchase of 3770 terminals; certain punched card, printer, or tape attachments have accrual rates that range from 30% to 60% • lease plan cancellation charges for all equipment are the smaller of lease fees for a 5-month period, or for 25% of the remaining term; IBM guarantees no more than a 5% per year rate increase for lease contracts • rental or lease plans provide for unlimited use.

Support • IBM markets and supports the 3770 through a nationwide network of local offices • maintenance is bundled into rental or lease maintenance charges and priced separately for purchased equipment • the 3770 models discussed in this report are supported as Category B products, which provides unlimited service 7 days per week, 24 hours per day • basic training is included in pricing with more extensive training at extra cost.

□ 3770 System Overview

The IBM 3770 consists of 9 principal products which support interactive, batch, or remote job entry applications in conjunction with IBM host processors. All support data communication, and operate under BSC and/or SDLC protocols.

The Model 3771 consists of 3 nonprogrammable disk-console, keyboard-printer terminals with print speeds of 40, 80, or 120 cps. All can be equipped with optional card punches to permit single-path card reading or punching. Each supports communication speeds to 4800 bps, and runs under BSC or SDLC protocol.

Model 3774 is comprised of 2 user-programmable disk-console keyboard-printer terminals offering print speeds of 80 to 120 cps. Both terminals can be equipped with optional memory increments, 1 or 2 removable diskettes, a punched card reader/punch, a display monitor, or a line printer. Both terminals also operate at communication speeds to 4800 bps, and support BSC or SDLC protocols.

The Model 3775 is also a user-programmable, desk-console keyboard-printer terminal with internal memory and diskette storage facilities. Except for the use of a 120-lpm line printer for printed copy, the 3775 is functionally equivalent to the 3774.

The 3776 series consists of 4 intermediate-speed, desk-console, keyboard printers which support remote batch jobs. Functional differences between members relates to the number of batch streams handled, and the amount of internal memory, auxiliary memory, and optional peripherals supported. Models 1 and 2, for example, feature a dual data path and allows concurrent online and off-line operations. Models 3 and 4 can interleave up to 6 independent data streams. Interactive communication is not supported. While all models support attachment of diskette and card read/punch modules, Module 3 and 4 also accommodate magnetic tape subsystems. The data transmission speeds also differ: Models 1 and 2 operate at 4800 bps, while Models 3 and 4 run at 19.2K bps. Protocols supported are also different: Models 1 and 2 run under BSC and/or SDLC, while the other 2 are SDLC only.

The 3777 series have many functional similarities with the 3776, but differ in RJE support and I/O configurations. The 3777 consists of high-speed, desk-console, keyboard-printer terminals which functionally differ in the number of batch job streams handled, communication capabilities, internal memory, auxiliary storage, and peripheral attachments. Model 1 features a dual data path, which allows concurrent online and off-line operations, and it operates under BSC or SDLC protocols.

Model 2 is a BSC multileaving workstation that supports programs written for the S/360 Model 20-5. The 3777 Models 3 and 4 are similar to the 3776 Models 3 and 4, but have additional RJE functions and expanded I/O configurations. With Model 3, the printer is not integrated but is a standalone 3203. Special features permit 1 or 2 diskette drives, 1 magnetic tape unit, 1 card reader, and 1 card punch. One of the 3 card readers can operate at 150, 300, or 400 cpm. The card punch runs at 50 cpm. Model 4 is essentially the same as Model 3, but employs a 3262 Model 2 or 12 printer. The 3777 Models 3 and 4, respectively, have communication facilities identical to the 3776 Models 3 and 4.

Various punched card, diskette, or magnetic tape I/O devices and communications facilities are configured with basic 3770 keyboard-printer arrangements to support 1 or more of the following operations or I/O modes.

Off-Line Modes

Keyboard-to-Printer and/or Card Punch • supported on 3771, 3774, and 3775 terminals.

Keyboard-to-Diskette • supported on 3774 and 3775 terminals.

Card Reader-to-Printer • supported on 3771, 3774, 3775, 3776, 3777 Model 1, and 3777 Model 3 terminals.

Card Reader-to-Card Punch • supported on 3774, 3775, 3776, and 3777 Model 3 terminals.

Card Reader-to-Diskette • supported on 3774, 3775, 3776, 3777 Model 1, and 3777 Model 3 terminals.

Card Reader-to-Magnetic Tape • supported on 3776 Model 3, 3776 Model 4, and 3777 Model 3 terminals.

Diskette-to-Printer • supported on 3774, 3775, 3776, 3777 Model 1, and 3777 Model 3 terminals.

Diskette-to-Card Punch • supported on 3774, 3775, 3776, and 3777 Model 3 terminals.

Diskette-to-Diskette • supported on 3774, 3775, 3776, 3777 Model 1, and 3777 Model 3 terminals.

Diskette-to-Magnetic Tape • supported on 3776 Model 3, 3776 Model 4, and 3777 Model 3 terminals.

Magnetic Tape-to-Printer • supported on 3776 Model 3, 3776 Model 4, and 3777 Model 3 terminals.

Magnetic Tape-to-Card Punch • supported on 3776 Model 3, 3776 Model 4, and 3777 Model 3 terminals.

Magnetic Tape-to-Diskette • supported on 3776 Model 3, 3776 Model 4, and 3777 Model 3 terminals.

Online Batch Modes

Line-to-Printer • supported on all 3770 series terminals.

Line-to-Card Punch • supported on 3771, 3774, 3775, 3776, 3777 Model 2, and 3777 Models 3 and 4 terminals.

Line-to-Diskette • supported on 3774, 3775, 3776, 3777 Model 1, and 3777 Models 3 and 4 terminals.

Line-to-Magnetic Tape • supported on 3776 Model 3, 3776 Model 4, and 3777 Models 3 and 4.

Card Reader-to-Line • supported on all 3770 series terminals.

Diskette-to-Line • supported on 3774, 3775, 3776, and 3777 terminals.

Magnetic Tape-to-Line • supported on 3776 Model 3, 3776 Model 4, and 3777 Models 3 and 4 terminals.

Online Interactive Modes

Keyboard-to-Line • supported on 3771, 3774, and 3775 terminals.

Line-to-Printer • supported on 3771, 3774, and 3775 terminals.

©1985 Data Decisions

IBM 3770 Series Data Communication Systems
Models 3771, 3774, 3775, 3776 & 3777

Concurrent Dual Data Path Online & Off-Line Batch Modes

Line-to-Printer With Card Reader-to-Diskette • supported on 3776 Model 1, 3776 Model 2, and 3777 Model 1 terminals.

Line-to-Printer With Diskette-to-Card Punch • supported on 3776 Model 1 and 3776 Model 2 terminals.

Line-to-Printer With Diskette-to-Diskette • supported on 3776 Model 1, 3776 Model 2, and 3777 Model 1 terminals.

Multileaved & Interleaved Modes

BSC Multileaving • supported on 3777 Model 2 terminal.

SNA/SDLC MLU Interleaving • up to 6 online data streams may be interleaved concurrently with off-line utility operation on 3776 Models 3 and 4, and 3777 Models 3 and 4 terminals.

3770 Communications

BSC Communications • supported by all 3770 terminals except 3776 Models 3 and 4, and 3777 Models 3 and 4 • line speeds of 1200/2400/4800 bps over point-to-point switched (dial), or point-to-point or multipoint nonswitched (private) facilities for 3771, 3774, 3775, and 3776 Models 1 and 2; 2400/4800 bps over point-to-point switched, or 2400/4800/7200/9600/19200 bps over point-to-point or multipoint nonswitched lines for 3777 Models 1 and 2 • IBM 2770-type BSC operation except for 3777 Model 2; IBM S/360 Model 20-5 BSC multileaving operation for 3777 Model 2; IBM 3780-type BSC operation for 3776 Models 1 and 2, and 3777 Model 1 • host communications connection via integrated communications adapter to IBM S/360 Model 25, or S/370 Model 115, 125, or 135; via data adapter unit to S/360, S/370, 3030, or 4300; or via 3704/3705/3725 Communications Controller to S/360 Model 30 to 195, S/370, 3030, or 4300.

SDLC Communications • supported by all 3770 terminals except the 3777 Model 2 • line speeds of 1200/2400/4800 bps over point-to-point switched (dial), or point-to-point or multipoint nonswitched (private) facilities for 3771, 3774, 3775, and 3776 Models 1 and 2; 2400/4800 bps over point-to-point switched, or 2400/4800/7200/9600/19200 bps over point-to-point or multipoint nonswitched lines for 3776 Models 3 and 4, and 3777 Models 1, 3, and 4 MLU-type SNA support for 3776 and 3777 Models 1, 3, and 4 terminals • host communications connection via 3704/3705/3725 Communications Controller to S/370, 3030, or 4300; or via communications adapter to 4331.

Compression/Expansion • improves data communication efficiency by substituting characters for blank card spaces • for BSC/SDLC, a 2-byte sequence is substituted for 3 or more consecutive blank card columns; 2-byte requires expanded at receive end.

☐ 3771 Communication Terminal (Nonprogrammable)

The IBM 3771 series consists of 3 nonprogrammable, desk-console, keyboard-printer terminals with optional punched card facilities. Functional differences between basic 3771 models are serial print speeds of 40, 80, or 120 cps. The terminals may be applied to data I/O, print, or card read/punch operations in off-line, online batch, or online interactive modes.

3771 Model 1 • 40-cps keyboard printer terminal and controller:

$380/$323 mo	$6,615 prch	$86.00 maint

3771 Model 2 • 80-cps keyboard printer terminal and controller:

429/365	6,930	98.00

3771 Model 3 • 120-cps keyboard printer terminal and controller:

510/434	8,190	114.00

3771 Upgrade • Model 1 to Model 2:

NA/NA	555	NA

3771 Upgrade • Model 1 to Model 3:

NA/NA	1,975	NA

3771 Upgrade • Model 2 to Model 3:

NA/NA	1,815	NA

3771 Operations

I/O Modes • mode established by operator via keyboard with provision for entering 1 printer format from either keyboard or card reader • off-line modes provide for keyboard-to-printer, keyboard-to-card punch and printer, or card reader-to-printer operation • online batch modes provide for card reader-to-line with monitor print, or line-to-card punch with monitor print operation • online interactive modes provide for keyboard-to-line and printer, or line-to-printer operation.

Buffer Operations • dual 256-byte buffers allow for overlapped I/O operation • buffer edit provides for correction of data by character, by line, by buffer, or by extended buffer blocks during key entry operations; extended 512-byte buffer provides for line transfer in 256-byte segments and will not support normal overlapped buffer I/O operations.

3771 Communications

The 3771 communicates in half-duplex over half-/full-duplex switched (dial) line facilities in point-to-point mode, or nonswitched (private) lines in both point-to-point and multipoint modes. Data rate is 1200/2400/4800 bps in BSC or SNA/SDLC protocol. Compression/expansion feature enhances transmission efficiency for batch card tasks by substituting a 2-byte sequence for each occurrence of 3 to 63 consecutive blank card columns; 2-byte sequence expansion back to the desired sequence of blank columns is also obtained during receive operations. (See 3770 System Overview section for other particulars.)

1460 SDLC/BSC Switch Control • operator switch for placing 3771 either in SDLC point-to-point or multipoint, or in BSC point-to-point mode • BSC multipoint requires feature 1462; cannot be used with features 1461 or 1470:

$40/$34 mo	$810 prch	$6.50 maint

1461 BSC Point-to-Point • provides BSC point-to-point capability • cannot be used with features 1460 or 1470:

21/18	504	3.50

1462 BSC Multipoint • provides BSC multipoint capability • requires feature 1460 or 1461:

19/16	347	1.00

1470 SDLC • provides SDLC point-to-point or multipoint capability • cannot be used with features 1460 or 1461:

19/16	440	3.50

1481 Driver • communications driver without clocking • requires feature 1460, 1461, or 1470; cannot be used with feature 1482:

19/16	347	2.00

1482 Driver & Clocking • communication driver with 1200-bps clocking • requires feature 1460, 1461, or 1470; cannot be used with feature 1481:

21/18	410	3.50

3701 EIA Interface • RS-232C interface and cable for attachment of external IBM or non-IBM modem • requires feature 1481 or 1482, and external 1200-bps to 4800-bps modem; cannot be used with 3771 integrated modems:

19/16	462	1.50

5500 Nonswitched Integrated Modem • 1200-bps integrated modem for point-to-point or multipoint operation over nonswitched line facilities • requires feature 1482; cannot be used with feature 3701 or another integrated modem:

28/24	701	5.00

5501 Switched Auto-Answer Integrated Modem • 1200-bps integrated modem for point-to-point operation over switched line

MO: first figure is monthly charge for month-to-month arrangement; second figure is for 2-year lease; both figures include prime-shift maintenance. PRCH: purchase price for single quantity. MAINT: monthly charge for prime-shift maintenance. NA: indicates not available. NC: indicates no charge. Prices are current as of December 1984.

 ©1985 Data Decisions

IBM 3770 Series Data Communication Systems
Models 3771, 3774, 3775, 3776 & 3777

facilities with manual originate/auto-answer capability • requires feature 1482; cannot be used with feature 3701 or another integrated modem:

40/34	882	5.00

5502 Switched Integrated Modem • 1200-bps integrated modem for point-to-point operation over switched line facilities with manual originate/manual answer capability • requires feature 1482; cannot be used with feature 3701 or another integrated modem:

28/24	701	5.00

3771 Keyboard Printer Console

Configuration • desk console with integral keyboard and serial impact matrix printer • dual 256-byte buffers for edit and I/O operations • keyboard, card reader, and/or system defined printer format control.

Printer • 40/80/120-cps (3771 Models 1/2/3) bidirectional, 7x8 matrix impact mechanism • 94-character EBCDIC or ASCII set • 132 columns at 10 cpi • 6 lpi • 3- to 15-inch wide forms • friction feed of 1- to 3-part forms; tractor feed of 1- to 6-part forms • electronically set and stored margins, horizontal tabs, and vertical format. (See initial 3771 section for console terminal pricing.)

1201 ASCII • 94-character ASCII set, keyboard, and communications facilities for 3771; replaces EBCDIC capability:

$26/$22 mo	$450 prch	$0.50 maint

8700 Tractor • 3- to 15-inch variable-width forms feed tractor:

6/5	176	2.50

1390 Audible Alarm • alarm for 3771 device error or not ready condition requiring operator intervention:

42/NA	42	1.00

4650 Keylock • disables I/O and control features of 3771 to prevent unauthorized access:

36/NA	36	NC

5450 Operator Identification Card Reader • reads magnetic stripe cards encoded in ABA format; accommodates 40 characters of which 37 are discretionary; each character contains 4 bits plus parity:

19/16	347	2.50

3771 Punched Card Attachments

3501 Card Reader • 50-cpm, 80-column punched card reader • EBCDIC or ASCII code • 400-card input hopper and output stacker • cannot be used with 3521 Card Punch; requires feature 8050:

$192/$163 mo	$4,080 prch	$39.00 maint

3521 Card Punch • 50-cpm, 80-column card punch • EBCDIC or ASCII code • 400-card input hopper and output stacker • functions also as card reader with feature 1521 • cannot be used with 3501 Card Reader:

408/347	8,420	84.50

8050 Card Reader Attachment • required for 3501 Card Reader attachment to 3771 terminals • cannot be used with feature 8150:

19/16	347	1.00

8150 Card Reader/Punch Attachment • required for 3521 Card Punch (or reader/punch) attachment to 3771 terminals • cannot be used with feature 8050:

28/24	480	4.00

1501 Card Print • 80-position, 64 EBCDIC or ASCII set, card edge print capability for 3521 Card Punch:

117/100	2,545	20.50

1521 Card Read/Punch Check • provides 3521 Card Punch with read and punch error check capabilities:

102/87	2,250	59.00

□ 3774 Communication Terminal

The IBM 3774 consists of 2 user-programmable, desk console, keyboard printer terminals with internal memory and diskette storage facilities. Functional differences between the basic 3774 models are serial print speeds of 80 or 120 cps. The terminals may also be equipped with optional memory increments, removable diskette storage modules, punched card reader/punch, display monitor, or line printer. The 3774 can perform a variety of off-line, online batch, or online interactive tasks operating under user application programs or IBM-supplied utilities. A no-cost emulator feature is also available for configuring the 3774 in a nonprogrammable mode. This feature emulates function of the now-discontinued nonprogrammable versions of the 3774 and precludes the use of program control.

3774 Model P1 • 80-cps programmable keyboard printer terminal and controller:

$516/$439 mo	$8,310 prch	$185.00 maint

3774 Model P2 • 120-cps programmable keyboard printer terminal and controller:

582/495	9,385	198.00

3774 Upgrade • Model P1 to P2:

NA/NA	1,075	NA

3774 Operations

I/O Modes • mode controlled by user and/or host program for programmable models; mode established from set of up to 5 predefined jobs for emulator nonprogrammable models • off-line modes provide for keyboard-to-printer; keyboard-to-diskette and printer; keyboard-to-card punch and printer; keyboard and diskette-to-printer and diskette; keyboard and diskette-to-printer and card punch; keyboard and card reader-to-printer and diskette; keyboard and card reader-to-printer and card punch; diskette-to-printer; diskette-to-diskette with monitor print; diskette-to-card punch with monitor print; card reader-to-printer; card reader-to-diskette with monitor print; or card reader-to-card punch with monitor print operation • online batch modes provide for diskette-to-line with monitor print; card reader-to-line with monitor print; line-to-printer; line-to-diskette with monitor print; or line-to-card punch with monitor print operation • online interactive modes provide for keyboard-to-line and printer; or line-to-printer operation.

Emulator Nonprogrammable 3774 Buffer Operations • dual 256-byte buffers allow for overlapped I/O operation • buffer edit provides for correction of data by character, by line, by buffer, or by extended buffer blocks during key entry operations; extended 512-byte buffer provides for line transfer in 256-byte segments and will not support normal overlapped buffer I/O operations.

Programmable 3774 Memory & Storage Operations • 3770 programs have access to the following 3774 resources: 3 256-byte buffers for working storage and data areas for application data set access; basic 6K bytes of memory (expandable to 22K bytes) for 3770 I/O control and communication control programs and for use as buffers and working storage; 8 10-digit plus sign and decimal point registers for arithmetic and data transfer operations; 200-byte source buffer for keyboard input, printer output, or display output, and for transfer to/from registers or other buffers; and 97K bytes of internal, fixed-diskette storage for user data and programs.

3774 Memory & Storage

Memory • the basic 6K-byte memory may be expanded to accommodate 3770 programs and peripheral functions on programmable 3774 terminals • supervisor control code requires 3K bytes • BSC programmable communications requires 2K bytes and SDLC programmable communications 7K bytes • Communications Mode code requires up to 10.8K bytes for BSC or up to 12.5K for SDLC operation • card reader requires 1.8K to 2.5K bytes; card punch requires 3K bytes • display feature requires 2.5K bytes • diskette data set buffers require from 0.25K to 1.25K bytes • application program and working storage for tables, storage transfers, etc, require additional memory.

6800 Storage Increment • 4K increment of programmable memory expanding 3774 capacity to 10K • cannot be used on emulator versions or with other memory expansion increments:

$22/$19 mo	$276 prch	$5.50 maint

©1985 Data Decisions

IBM 3770 Series Data Communication Systems
Models 3771, 3774, 3775, 3776 & 3777

6801 Storage Increment • 8K increment of programmable memory expanding 3774 capacity to 14K • cannot be used on emulator versions or with other memory expansion increments:

41/35	501	8.00

6802 Storage Increment • 12K increment of programmable memory expanding 3774 capacity to 18K • cannot be used on emulator versions or with other memory expansion increments:

61/52	716	15.50

6803 Storage Increment • 16K increment of programmable memory expanding 3774 capacity to 22K • cannot be used on emulator versions or with other memory expansion increments:

79/67	919	18.50

6010 Record Format • off-line extended buffer expansion increment for 3774 terminals employing nonprogrammable emulator; increases extended buffer size from 512 to 2048 bytes, enhancing off-line operations and allowing the use of dual (keyboard plus card or diskette, or printer plus card or diskette) I/O devices • cannot be employed on programmable 3774 terminals:

40/34	662	6.50

Diskette Storage • 99.8K-byte internal, fixed diskette storage facilities are available on both nonprogrammable and programmable 3774 terminal configurations • diskette is formatted into 30 data tracks, with 26 sectors per track and 128 bytes per sector; up to 780 128-byte or 390 256-byte records may be accommodated • programmable SDLC communications reduces track capacity from 30 to 28 • a maximum of 18 user-written data sets may reside on 3774 diskette storage facilities; up to 7 data sets may be opened for any single program; program library may hold a maximum of 99 user programs.

4901 Diskette Storage • first removable diskette storage module providing an additional 242.9K bytes of storage • diskette is formatted into 73 data tracks, with 26 sectors per track and 128 bytes per sector; up to 949 256-byte records can be stored per diskette:

112/96	1,770	23.50

4902 Diskette Storage • second removable diskette storage module providing another 242.9K bytes of storage • additional function provided allows for diskette-to-diskette copy; pool or concatenate on a data set basis; read/write continue from first to second diskette (emulator nonprogrammable models only; not allowed for keyboard data entry operations); and, in conjunction with feature 6010, buffer dump and keyboard update on first diskette and final storage on second diskette (emulator nonprogrammable models only) • requires 4901 Diskette Storage module:

112/96	1,770	9.50

3774 Communications

The 3774 communicates in half-duplex over half-/full-duplex switched (dial) line facilities in point-to-point mode, or nonswitched (private) lines in both point-to-point or multipoint modes. Data rate is 1200/2400/4800 bps in BSC or SNA/SDLC protocol. A CPU interrupt capability allows the automatic interruption of off-line 3774 operations for the reception of CPU messages on diskette or at the printer. (See 3770 System Overview section for other particulars.)

Programmable 3774 Communications • transmission may be controlled by user-written programs or by implementing a Communicate mode under either keyboard command or supervisor program code • programmable function provides for the selection of diskette data sets, card reader, or keyboard for data input, and for forwarding output to diskette data sets, card punch, or printer.

Emulator Nonprogrammable 3774 Communications • compression/expansion feature identical to that implemented on 3771 Communication Terminal enhances transmission/reception efficiency for batch card tasks.

1460 SDLC/BSC Switch Control • operator switch for placing 3774 either in SDLC point-to-point or multipoint, or in BSC point-to-point mode • BSC multipoint requires feature 1462; cannot be used with features 1461 or 1470:

$40/$34 mo	$810 prch	$7.00 maint

1461 BSC Point-to-Point • provides BSC point-to-point capability • cannot be used with feature 1460 or 1470:

21/18	504	4.00

1462 BSC Multipoint • provides BSC multipoint capability • requires feature 1460 or 1461:

19/16	347	1.50

1470 SDLC • provides SDLC point-to-point or multipoint capability • cannot be used with feature 1460 or 1461:

19/16	440	4.00

1481 Driver • communications driver without clocking • requires feature 1460, 1461, or 1470; cannot be used with feature 1482:

19/16	347	2.50

1482 Driver & Clocking • communications driver with 1200-bps clocking • requires feature 1460, 1461, or 1470; cannot be used with feature 1481:

21/18	410	4.00

3701 EIA Interface • RS-232C interface and cable for attachment of external IBM or non-IBM modem • requires feature 1481 or 1482, and external 1200-bps to 4800-bps modem; cannot be used with 3774 integrated modems:

19/16	462	2.00

5500 Nonswitched Integrated Modem • 1200-bps integrated modem for point-to-point or multipoint operation over nonswitched line facilities • requires feature 1482; cannot be used with feature 3701 or another integrated modem:

28/24	701	6.00

5501 Switched Auto-Answer Integrated Modem • 1200-bps integrated modem for point-to-point operation over switched line facilities with manual originate/auto-answer capability • requires feature 1482; cannot be used with feature 3701 or another integrated modem:

40/34	882	5.50

5502 Switched Integrated Modem • 1200-bps integrated modem for point-to-point operation over switched line facilities with manual originate/manual answer capability • requires feature 1482; cannot be used with feature 3701 or another integrated modem:

28/24	701	5.50

5600 Nonswitched Point-to-Point Integrated Modem • 2400-bps integrated modem for point-to-point operation over nonswitched line facilities • requires feature 1481; cannot be used with feature 3701 or another integrated modem:

111/95	2,320	7.50

5602 Nonswitched Multipoint Integrated Modem • 2400-bps integrated modem for multipoint operation over nonswitched line facilities • requires feature 1481; cannot be used with feature 3701 or another integrated modem:

118/101	2,520	7.50

5610 Switched Auto-Answer Integrated Modem • 2400-bps integrated modem for point-to-point operation over switched line facilities with manual originate/auto-answer capability • requires feature 1481; cannot be used with feature 3701 or another integrated modem:

118/101	2,520	8.50

7951 Switched Network Backup • provides switched network facilities for 5600 and 5602 nonswitched integrated modems • cannot be used with feature 3701:

15/13	378	1.50

3901 Modem Fan-Out • equips the 2400-bps integrated modem (5602) to service up to 3 terminals:

31/26	720	2.00

3774 Keyboard Printer Console

Configuration • desk console with integral keyboard, serial-impact matrix printer, 6K memory, and diskette storage.

©1985 Data Decisions

IBM 3770 Series Data Communication Systems
Models 3771, 3774, 3775, 3776 & 3777

Console Printer • 80-/120-cps (3774 Models P1/P2) bidirectional, 7x8 matrix impact mechanism • 94-character EBCDIC or ASCII set • 132 columns at 10 cpi • 6 or 8 lpi • 3- to 15-inch wide forms • friction feed of 1- to 3-part forms; tractor feed of 1- to 6-part forms • program-controlled or emulator nonprogrammable electronically set and stored margins, horizontal tabs, and vertical format. (See initial 3774 section for console terminal pricing.)

3250 Display • display monitor attachment for programmable 3774 models • provides display capability for keyboard entry and update, and diskette enquiry applications; for operator messages; and for program debug operations • 480 characters at 12-line by 40-character format • 94-character EBCDIC or ASCII set • program statements for cursor position, and positioning of data by line, field, or character:

$149/$127 mo	$2,520 prch	$56.50 maint

3784 Line Printer • floor-console line printer for attachment to 3774 as alternate printout source • 155 lpm with 48-character set; 120 lpm with 64-character set; or 80 lpm with 94-character set • removable character belt impact mechanism • 48/64/94-character EBCDIC or ASCII sets • 132 columns at 10 cpi • 6 or 8 lpi • 15-inch tractor feed • requires feature 8155:

598/509	14,820	90.00

8155 Printer Attachment • required for attachment of 3274 Line Printer to 3774 terminal:

28/24	480	2.50

1201 ASCII • 94-character ASCII set, keyboard, and communications facilities for 3774 console; replaces EBCDIC capability:

26/22	450	0.50

4660 Keypad • numeric-only keypad attachment for 3774 console • cannot be used with emulator nonprogrammable models:

16/14	315	3.00

8700 Tractor • 3- to 5-inch variable-width forms feed tractor for 3774 console printer:

6/5	168	0.50

1390 Audible Alarm • alarm for 3774 device error or not ready condition requiring operator intervention:

42/NA	42	0.50

4650 Keylock • disables I/O and control features of 3774 to prevent unauthorized access:

36/NA	36	NC

5450 Operator Identification Card Reader • reads magnetic stripe cards encoded in ABA format; accommodates 40 characters of which 37 are discretionary; each character contains 4 bits plus parity:

19/16	347	3.00

3774 Punched Card Attachments

2502 Model A1 Card Reader • 150-cpm, 80-column punched card reader • EBCDIC or ASCII code • 700-card input hopper and 600-card output stacker • cannot be used with 3501 Card Reader; requires features 3782 Model 2 and 8149:

$230/NA mo	$7,405 prch	$65.00 maint

2502 Model A2 Card Reader • 300-cpm, 80-column punched card reader • other features identical to 2502 Model A1:

246/NA	8,030	65.00

3501 Card Reader • 50-cpm, 80-column punched card reader • EBCDIC or ASCII code • 400-card input hopper and output stacker • cannot be used with 2502 Card Reader; requires feature 8050:

192/163	4,080	39.00

3521 Card Punch • 50-cpm, 80-column card punch • EBCDIC or ASCII code • 400-card input hopper and output stacker • functions also as card reader with feature 1521; for 3774 emulator nonprogrammable models, will only function as card reader if 2502 or 3501 Card Readers are not employed • requires feature 8050:

408/347	8,420	84.50

8050 Card Reader Attachment • required for 3501 Card Reader attachment to 3774 terminals • cannot be used with feature 8149:

19/16	347	1.50

8149 Card Reader Attachment • required for 2502 Card Reader attachment to 3774 terminals • cannot be used with feature 8050:

28/24	480	5.00

8150 Card Reader/Punch Attachment • required for 3521 Card Punch attachment to 3774 terminals:

28/24	480	4.50

4650 Interchangeable Feed • allows input of 51- as well as 80-column cards to 2502 Card Reader models • cannot be used with feature 4651:

52/NA	1,590	20.00

4651 Interchangeable Feed • allows input of 66- as well as 80-column cards to 2502 Card Reader models • cannot be used with feature 4650:

52/NA	1,590	20.00

5450 Operator Identification Card Reader • reads magnetic stripe cards encoded in ABA format; accommodates 40 characters of which 37 are discretionary; each character contains 4 bits plus parity:

18/15	347	2.50

1501 Card Print • 80-position, 64-character EBCDIC or ASCII set, card edge print capability for 3521 Card Punch:

117/110	2,545	20.50

1521 Card Read/Punch Check • provides 3521 Card Punch with read and punch error check capabilities:

102/87	2,250	59.00

☐ 3775 Communication Terminal

The IBM 3775 is a user-programmable, desk-console, keyboard-printer terminal with internal memory and diskette storage facilities. Except for the use of a 120-lpm line printer as a printout mechanism, the 3775 is functionally the same as the IBM 3774 series. As with the 3774, the 3775 may be equipped with optional memory increments, removable diskette storage modules, punched card reader/punch, and display monitor; unlike the 3774, the 3775, already configured with an integral line printer, cannot employ a separate line printer module. The 3775, like the 3774, can perform a variety of off-line, online batch, or online interactive tasks operating under user application programs or IBM-supplied utilities. Likewise, a no-cost emulator feature is also available for configuring the 3775 in a nonprogrammable mode. This feature emulates function of the now-discontinued nonprogrammable version of the 3775 and precludes the use of program control.

3775 Model P1 • 120-lpm programmable keyboard printer terminal and controller:

$785/$668 mo	$12,600 prch	$258.00 maint

3775 Operations

I/O Modes • mode controlled by user and/or host program for programmable model, or established from set of up to 5 predefined jobs for emulator nonprogrammable model • off-line, online batch, and online interactive functions identical to 3774. (See 3774 Operations section for particulars.)

Emulator Nonprogrammable 3775 Buffer Operation • identical to 3774. (See 3774 Operations section for particulars.)

Programmable 3775 Memory & Storage Operations • identical to 3774. (See 3774 Operations section for particulars.)

3775 Memory & Storage

Memory • as with the 3774, the basic 6K-byte memory of the 3775 may be expanded to 22K bytes to accommodate 3770 programs and peripheral functions on programmable configuration • memory requirements for control code,

©1985 Data Decisions

IBM 3770 Series Data Communication Systems
Models 3771, 3774, 3775, 3776 & 3777

communications overhead, etc are identical to those on the 3774. (See 3774 Memory & Storage section for particulars.)

6800 Storage Increment • 4K increment of programmable memory expanding 3775 capacity to 10K • cannot be used on emulator model or with other memory expansion increments:

$22/$19 mo	$276 prch	$5.50 maint

6801 Storage Increment • 8K increment of programmable memory expanding 3775 capacity to 14K • cannot be used on emulator model or with other memory expansion increments:

41/35	501	8.00

6802 Storage Increment • 12K increment of programmable memory expanding 3775 capacity to 18K • cannot be used on emulator model or with other memory expansion increments:

61/52	716	16.00

6803 Storage Increment • 16K increment of programmable memory expanding 3775 capacity to 22K • cannot be used on emulator model or with other memory expansion increments:

79/67	919	19.00

6010 Record Format • off-line extended buffer expansion increment for 3775 terminal employing nonprogrammable emulator; increases extended buffer size from 512 to 2048 bytes, enhancing off-line operations and allowing the use of dual I/O devices • cannot be employed on programmable 3775 terminal:

40/34	662	6.50

Diskette Storage • 99.8K-byte, internal, fixed diskette storage facilities are available for both programmable and nonprogrammable emulator 3775 configurations • diskette format and function identical to 3774. (See 3774 Memory & Storage section for particulars.)

4901 Diskette Storage • first removable diskette storage module providing an additional 242.9K bytes of storage • format identical to 3774 (see 3774 Memory & Storage section for particulars):

112/96	1,770	23.50

4902 Diskette Storage • second removable diskette storage module • requires 4901 Diskette Storage module • format and function provided identical to 3774 (see 3774 Memory & Storage section for particulars):

112/96	1,770	9.50

3775 Communications

As with the 3774, the 3775 communicates in half-duplex over half-/full-duplex switched (dial) line facilities in point-to-point mode, or nonswitched (private) lines in both point-to-point or multipoint modes. Data rate is 1200/2400/4800 bps in BSC or SNA/SDLC protocol. A CPU interrupt capability allows the automatic interruption of off-line 3775 operations for the reception of CPU messages on the diskette or at the printer. (See 3770 System Overview section for other particulars.)

Programmable 3775 Communications • identical to 3774. (See 3774 Communications section for particulars.)

Emulator Nonprogrammable 3775 Communications • identical to 3774. (See 3774 Communications section for particulars.)

1460 SDLC/BSC Switch Control • operator switch for placing 3775 either in SDLC point-to-point or multipoint, or in BSC point-to-point mode • BSC multipoint requires feature 1462; cannot be used with feature 1461 or 1470:

$40/$34 mo	$810 prch	$7.00 maint

1461 BSC Point-to-Point • provides BSC point-to-point capability • cannot be used with feature 1460 or 1470:

21/18	504	4.00

1462 BSC Multipoint • provides BSC multipoint capability • requires feature 1460 or 1461:

19/16	347	1.50

1470 SDLC • provides SDLC point-to-point or multipoint capability • cannot be used with feature 1460 or 1461:

19/16	440	4.00

1481 Driver • communications driver without clocking • requires feature 1460, 1461, or 1470; cannot be used with feature 1482:

19/16	347	2.50

1482 Driver & Clocking • communications driver with 1200-bps clocking • requires feature 1460, 1461, or 1470; cannot be used with feature 1481:

21/18	410	4.00

3701 EIA Interface • RS-232C interface and cable for attachment of external IBM or non-IBM modem • requires feature 1481 or 1482, and external 1200-bps to 4800-bps modem; cannot be used with 3774 integrated modems:

19/16	462	2.00

5500 Nonswitched Integrated Modem • 1200-bps integrated modem for point-to-point or multipoint operation over nonswitched line facilities • requires feature 1482; cannot be used with feature 3701 or another integrated modem:

28/24	701	6.00

5501 Switched Auto-Answer Integrated Modem • 1200-bps integrated modem for point-to-point operation over switched line facilities with manual originate/auto-answer capability • requires feature 1482; cannot be used with feature 3701 or another integrated modem:

40/34	882	5.50

5502 Switched Integrated Modem • 1200-bps integrated modem for point-to-point operation over switched line facilities with manual originate/manual answer capability • requires feature 1482; cannot be used with feature 3701 or another integrated modem:

28/24	701	5.50

5600 Nonswitched Point-to-Point Integrated Modem • 2400-bps integrated modem for point-to-point operation over nonswitched line facilities • requires feature 1481; cannot be used with feature 3701 or another integrated modem:

111/95	2,320	7.50

5602 Nonswitched Multipoint Integrated Modem • 2400-bps integrated modem for multipoint operation over nonswitched line facilities • requires feature 1481; cannot be used with feature 3701 or another integrated modem:

118/101	2,520	7.50

5610 Switched Auto-Answer Integrated Modem • 2400-bps integrated modem for point-to-point operation over switched line facilities with manual originate/auto-answer capability • requires feature 1481; cannot be used with feature 3701 or another integrated modem:

118/101	2,520	8.50

7951 Switched Network Backup • provides switched network facilities for 5600 and 5602 nonswitched integrated modems • cannot be used with feature 3701:

15/13	378	1.50

3901 Modem Fan-Out • equips the 2400-bps integrated modem (5602) to service up to 3 terminals:

31/26	720	2.00

3775 Keyboard Printer Console

Configurations • desk console with integral keyboard, impact belt line printer, 6K memory, and diskette storage.

Console Printer • 120 lpm with 64-character set; 80 lpm with 94-character set; removable character belt impact mechanism • 64-/94-character EBCDIC or ASCII sets • 132 columns at 10 cpi • 6 or 8 lpi • 15-inch forms tractor feed • program-controlled or emulator nonprogrammable, electronically set and stored margins, horizontal tabs, and vertical format. (See initial 3775 section for console terminal pricing.)

3250 Display • display monitor attachment for programmable 3775 model • provides display capability for keyboard entry and update, and diskette enquiry applications; for operator messages; and for program debug operations • 480-character at 12-line by 40-character format • 94-character EBCDIC or ASCII set •

 ©1985 Data Decisions

IBM 3770 Series Data Communication Systems
Models 3771, 3774, 3775, 3776 & 3777

program statements for cursor position, and positioning of data by line, field, or character:

$149/$127 mo	$2,520 prch	$56.50 maint

1201 ASCII • 94-character ASCII set, keyboard, and communications facilities for 3775 console; replaces EBCDIC capability:

26/22	450	0.50

4660 Keypad • numeric-only keypad attachment for 3775 console • cannot be used with emulator nonprogrammable configuration:

16/14	315	3.00

3551 Dual Feed • dual, independent, pinfeed split platen for 3775 line printer • cannot be used with emulator nonprogrammable configuration:

44/38	788	19.00

1390 Audible Alarm • alarm for 3775 device error or not ready condition requiring operator intervention:

42/NA	42	0.50

4650 Keylock • disables I/O and control features of 3775 to prevent unauthorized access:

36/NA	36	NC

5450 Operator Identification Card Reader • reads magnetic stripe cards encoded in ABA format; accommodates 40 characters of which 37 are discretionary; each character contains 4 bits plus parity:

19/16	347	3.00

3775 Punched Card Attachments

2502 Model A1 Card Reader • 150-cpm, 80-column punched card reader • EBCDIC or ASCII code • 700-card input hopper and 600-card output stacker • cannot be used with 3501 Card Reader; requires features 3782 Model 2 and 8149:

$246/NA mo	$7,405 prch	$65.00 maint

2502 Model A2 Card Reader • 300-cpm, 80-column punched card reader • other features identical to 2502 Model A1:

309/NA	8,030	65.00

3501 Card Reader • 50-cpm, 80-column punched card reader • EBCDIC or ASCII code • 400-card input hopper and output stacker • cannot be used with 2502 Card Reader; requires feature 8050:

192/163	4,080	39.00

3521 Card Punch • 50-cpm, 80-column card punch • EBCDIC or ASCII code • 400-card input hopper and output stacker • functions also as card reader with feature 1521 • requires features 3782 Model 1 and 8150:

408/347	8,420	84.50

8050 Card Reader Attachment • required for 3501 Card Reader attachment to 3775 • cannot be used with feature 8149:

19/16	347	1.50

8149 Card Reader Attachment • required for 2502 Card Reader attachment to 3775 • cannot be used with feature 8050:

28/24	480	5.00

8150 Card Punch Attachment • required for 3521 Card Punch attachment to 3775:

28/24	480	4.50

4650 Interchangeable Feed • allows input of 51- as well as 80-column cards to 2502 Card Reader • cannot be used with feature 4651:

52/NA	1,590	20.00

4651 Interchangeable Feed • allows input of 66- as well as 80-column cards to 2502 Card Reader • cannot be used with feature 4650:

52/NA	1,590	20.00

5450 Operator Identification Card Reader • reads magnetic stripe cards encoded in ABA format; accommodates 40 characters of which 37 are discretionary; each character contains 4 bits plus parity:

19/16	347	3.00

1501 Card Print • 80-position, 64-character EBCDIC or ASCII set, card edge print capability for 3521 Card Punch:

117/100	2,545	20.50

1521 Card Read/Punch Check • provides 3521 Card Punch with read and punch error check capabilities:

102/87	2,250	59.00

☐ 3776 Communication Terminal

The IBM 3776 series consists of 4 intermediate-speed, desk-console, keyboard-printer, remote batch terminals. Functional differences between members relate to the batch jobs that may be performed, to communications capabilities, and to associated internal memory, storage, and optional peripheral attachments. The 3776 Model 1 or 2 features a dual data path which allows for concurrent online and off-line operations, and communications at rates up to 4800 bps. Both are SNA Single Logical Unit (SLU) and BSC terminals. The 3776 Model 3 or 4 under multiple logic unit (MLU) protocol of SNA can interleave up to 6 independent data streams to/from a host at speeds of up to 19,200 bps. None of the 3776 terminals can be operated in an online interactive mode or be employed for keyboard data entry; console keyboard is only provided for entering terminal job commands and transmitting messages to the host processor. All 3776 models will support the attachment of diskette and card read/punch modules. In addition, the 3776 Model 3 or 4 will support magnetic tape subsystems. These models also have integral storage for spooling and for storing control or other operating procedures, and come equipped with a display monitor.

3776 Model 1 • 160/230/300-lpm keyboard printer terminal accommodating 48/64/94-character set • dual 256-byte and 512-byte transmission buffers:

$983/$837 mo	$18,000 prch	$223.00 maint

3776 Model 2 • 230/300/400-lpm keyboard printer terminal accommodating 48/64/94-character set • dual 256-byte and 512-byte transmission buffers:

1,132/963	20,700	246.00

3776 Model 3 • 160/230/300-lpm keyboard printer, display terminal accommodating 48/64/94-character set • 15K-byte definitions and producers, and 80K-byte message storage:

1,469/1,250	30,000	329.00

3776 Model 4 • 230/300/400-lpm keyboard printer, display terminal accommodating 48/64/94-character set • keyboard printer, display terminal • 15K-byte definitions and procedures, and 80K-byte message storage:

1,610/1,370	33,000	349.00

3776 Upgrade • Model 3 to Model 4:

NA/NA	3,000	NA

3776 Operations

I/O Modes—3776 Models 1 & 2 • up to 5 user-defined formats may be entered from keyboard or optional diskette and/or punched card attachments • off-line modes provide for diskette-to-printer; diskette-to-diskette; diskette-to-card punch; card reader-to-printer; card reader-to-diskette; or card reader-to-card punch operations • online batch modes provide for diskette-to-line; card reader-to-line; line-to-printer; line-to-diskette; or line-to-card punch operations • dual data path concurrent modes provide for line-to-printer operation in conjunction with either diskette-to-diskette; or diskette-to-card punch; or card reader-to-diskette operations • an automatic card-to-line feature may be used to start a card reader-to-line job when an online job is completed and the 3776 goes to a standby status.

I/O Modes—3776 Models 3 & 4 • local utility jobs may be run concurrently with online jobs, with online job submission initiated when an SNE session is available for data transmission; up to 6 concurrent sessions may be established • data from different

©1985 Data Decisions

IBM 3770 Series Data Communication Systems
Models 3771, 3774, 3775, 3776 & 3777

input devices or data sets may be concatenated into a single-input data stream as 1 job execution • concurrent local or off-line modes provide for diskette-to-printer; diskette-to-diskette; diskette-to-card punch; diskette-to-mag tape; card reader-to-printer; card reader-to-diskette; card reader-to-card punch; card reader-to-mag tape; mag tape-to-printer; mag tape-to-diskette; or mag tape-to-card punch operations • online batch modes provide for diskette-to-line; card reader-to-line; mag tape-to-line; line-to-printer; line-to-display; line-to-diskette; line-to-card punch; line-to-mag tape; or console-to-line operations • optional "hot reader" function may be enabled, specifying that the 3776 continually test reader for card input.

Buffer Operations—3776 Models 1 & 2 • online I/O device and line, and off-line I/O device data transfers employ overlapped dual 256-byte and/or 512-byte buffers.

Buffer Operations—3776 Models 3 & 4 • data transfer between I/O devices and communications line handled by 256- or 512-byte buffer • SDLC uses a customer-defined Request/Response Unit (RU).

Internal Storage Operations—3776 Models 3 & 4 • system messages may be spooled in a terminal storage area capable of storing up to 1000 80-byte messages • job, utility, and test procedures or definition commands may be stored in 480 32-byte sections of terminal storage.

3776 Storage & Magnetic Tape Attachments

Diskette Storage • all members of the 3776 series may be equipped with up to 2, optional, removable diskette, storage attachment modules for the performance of the various diskette-related I/O mode operations described previously • additional diskette implemented features on the 3776 Models 3 and 4 include capability to assign drive individually to independent host SNA session and/or used locally for I/O operations; user may also specify if batch data from host is to be written on diskette on an as received basis, on a print format line/record basis, or on a card format card image/record basis • each diskette provides up to 242.9K bytes of storage formatted into 73 data tracks with 26 sectors per track and 128 bytes per sector.

4901 Diskette Storage • first removable diskette storage module • provides ability to pool or concatenate on data set basis for 3776 Models 3 and 4:

$112/$96 mo	$1,770 prch	$23.50 maint

4902 Diskette Storage • second removable diskette storage module • provides ability to pool or concatenate on data set basis for 3776 Models 1 and 2 • provides for automatic continuous read/write diskette operation from first to second diskette, or for diskette-to-diskette copy operations on all 3776 models • requires 4901 module:

112/96	1,770	9.50

Magnetic Tape • only 3776 Model 3 and 4 (3777 Models 3 and 4) terminals may be equipped with magnetic tape capability for the performance of the various tape-related I/O mode operations described previously • records may be fixed or variable length, with maximum record size of 200 bytes; records may be unblocked or blocked, with maximum block size of 4K bytes • tapes may be unlabeled or labeled, and multiple data sets may be contained on a single tape; multivolume data sets may be employed with labeled tapes.

3411 Model 1 Magnetic Tape Unit & Control • 12.5-ips mag tape drive and 1600-bpi 9-track controller; 20K bps • 3776 (3777) will only support single tape drive • requires features 7003, 7801, and 3211 or 3321 and 9150:

677/623	7,910	178.00

7003 Attachment • allows attachment of 3411 Model 1 drive and controller to 3776 Models 3 and 4 (3777 Model 3) terminals • requires feature 7801:

120/110	1,880	5.00

7801 Attachment • allows attachment of 3776 Models 3 and 4 (3777 Model 3) terminals to 3411 Model 1 drive and controller • requires feature 7003:

190/162	4,000	17.50

3211 Single-Density Feature • 1600-bpi, 9-track format for 3411 Model 1 tape drive:

88/81	1,140	15.00

3221 Dual-Density Feature • 800-/1600-bpi, 9-track format for 3411 Model 1 tape drive:

130/119	2,185	53.50

3776 Communications

3776 Models 1 & 2 Communications • half-duplex over half-/full-duplex switched (dial) line facilities in point-to-point mode, or nonswitched (private) lines in both point-to-point or multipoint modes; data rate is 1200/2400/4800 bps in BSC or SNA/SDLC • compression/expansion feature enhances transmission efficiency for data transmission operations; for BSC, batch diskette, or card jobs, a 2-byte sequence is substituted for each occurrence of 3 to 63 consecutive blank bytes; for SDLC, diskette, or card jobs, an ID sequence may be substituted for each occurrence of 2 or more consecutive spaces or data characters • a record compression feature allows the off-line compression of diskette records; using 2 diskette drives, records from basic exchange diskette are compressed and written onto a single diskette for subsequent batch transmission; using 1 diskette drive, records from a basic exchange diskette are compressed into 256- or 512-byte blocks for subsequent batch transmission.

1460 SDLC/BSC Switch Control • operator switch for placing 3776 Model 1 or 2 either in SDLC point-to-point or multipoint, or in BSC point-to-point mode • BSC multipoint requires feature 1462; cannot be used with feature 1461 or 1470:

$40/$34 mo	$810 prch	$6.00 maint

1461 BSC Point-to-Point • provides BSC point-to-point capability • cannot be used with feature 1460 or 1470:

21/18	504	4.00

1462 BSC Multipoint • provides BSC multipoint capability • requires feature 1460 or 1461:

19/16	347	1.50

1470 SDLC • provides SDLC point-to-point or multipoint capability • cannot be used with feature 1460 or 1461:

19/16	440	4.00

1481 Driver • communications driver without clocking • requires feature 1460, 1461, or 1470:

19/16	347	2.50

3701 EIA Interface • RS-232C interface and cable for attachment of external IBM or non-IBM modem • requires feature 1481 and external 1200-bps to 4800-bps modem; cannot be used with 3776 integrated modems:

19/16	440	2.00

5600 Nonswitched Point-to-Point Integrated Modem • 2400-bps integrated modem for point-to-point operation over nonswitched line facilities • requires feature 1481; cannot be used with feature 3701 or another integrated modem:

111/95	2,320	6.00

5602 Nonswitched Multipoint Integrated Modem • 2400-bps integrated modem for multipoint operation over nonswitched line facilities • requires feature 1481; cannot be used with feature 3701 or another integrated modem:

118/101	2,520	6.00

5610 Switched Auto-Answer Integrated Modem • 2400-bps integrated modem for point-to-point operation over switched line facilities with manual originate/auto-answer capability • requires feature 1481; cannot be used with feature 3701 or another integrated modem:

118/101	2,520	7.00

5700 Nonswitched Point-to-Point Integrated Modem • 4800-bps integrated modem for point-to-point operation over 4-wire nonswitched line facilities • auto equalization and manual half-speed select • requires feature 1481; cannot be used with feature 3701 or another integrated modem:

229/195	3,600	56.50

 ©1985 Data Decisions

IBM 3770 Series Data Communication Systems
Models 3771, 3774, 3775, 3776 & 3777

5702 Nonswitched Point-to-Point Integrated Modem • 4800-bps integrated modem for multipoint operation over 4-wire nonswitched line facilities • auto equalization and manual half-speed select • requires feature 1481; cannot be used with feature 3701 or another integrated modem:

229/195	3,600	56.50

5710 Switched Auto-Answer Integrated Modem • 4800-bps integrated modem for point-to-point operation over switched line facilities with manual originate/auto-answer capability • auto equalization and manual half-speed select • requires feature 1481; cannot be used with feature 3701 or another integrated modem:

288/220	4,050	59.50

7951 Switched Network Backup • provides switched network backup facilities for 5600 and 5602, 2400-bps nonswitched integrated modems • cannot be used with feature 3701:

15/13	360	1.50

7952 Switched Network Backup • provides switched network backup facilities for 5700 and 5702, 4800-bps nonswitched integrated modems • cannot be used with feature 3701:

37/33	600	4.00

3901 Modem Fan-Out • allows 5601, 2400-bps multipoint modem to be shared by 3 terminals:

31/26	720	2.00

3902 Modem Fan-Out • allows 5702, 4800-bps multipoint modem to be shared by 3 terminals:

44/38	750	2.00

3776 Models 3 & 4 Communications • half-duplex over half-/full-duplex switched (dial) line facilities in point-to-point mode in SDLC at data rate of 2400/4800 bps; half-duplex over half-/full-duplex nonswitched (private) lines in point-to-point or multipoint mode in SDLC at data rate of 2400/4800/7200/9600/19,200 bps; full-duplex operation over nonswitched facilities only when communicating with 3705 Communications Controller • compression/expansion feature enhances transmission efficiency for data transmission operations; for diskette, magnetic tape, or card jobs, an ID sequence may be substituted for each occurrence of 2 or more consecutive spaces or data characters • a decompaction feature reads compacted data forwarded from host where a pair of alphanumeric characters is represented by a single byte during transmission • encrypt/decrypt capability in conjunction with host program products 5735-RC2 and 5740-XY5 provides for secure transmissions to/from the host.

3701 EIA Interface • RS-232C interface and cable for attachment of external IBM or non-IBM modem • requires external 2400-bps to 19,200-bps modem; cannot be used with feature 4501, 4720, 5650, or 5651:

19/16	440	2.00

4501 High-Speed Digital Interface • interface and cable for attachment of external 19,200-bps modem for point-to-point or multipoint synchronous transmission over wideband channels • requires external modem; cannot be used with feature 3701, 4720, 5650, or 5651:

65/55	1,400	2.00

4720 V35 Interface • provides for direct attachment to 3705 Communications Controller for 14,400-bps transmission • cannot be used with feature 3701, 4501, 5650, or 5651:

21/18	510	3.00

5650 DDS Adapter • provides for 2400/4800/9600-bps point-to-point transmission over AT&T DDS network • cannot be used with feature 3701, 4501, 4720, or 5651:

37/32	840	3.00

5651 DDS Adapter • provides for 2400/4800/9600-bps multipoint transmission over AT&T DDS network • cannot be used with feature 3701, 4501, 4720, or 5650:

37/32	840	3.00

3680 Encrypt/Decrypt • provides for secure transmission in conjunction with host programming facilities:

75/64	1,600	2.50

3776 Keyboard Printer Console

Configuration • desk console with integral keyboard and line printer (3776 Models 1 and 2), or with integral keyboard, line printer, display, and terminal storage (3776 Models 3 and 4).

Console Printer • 300/230/160 lpm with 48/64/94-character set (3776 Models 1 and 3); 400/300/230 lpm with 48/64/94-character set (3776 Models 2 and 4); removable character belt impact mechanism • 48/64/94-character EBCDIC or ASCII sets • 132 columns at 10 cpi • 6 or 8 lpi • 15-inch forms tractor feed • format controls for margins, horizontal tabs, and vertical page format. (See initial 3776 section for console terminal pricing.)

Console Display—3776 Models 3 & 4 • provides display capability for terminal-host messages, host input, and prompt or status information • 1024 characters at 16-line by 64-character format; 13 lines for host-terminal messages; 3 lines for status and prompt • 64-character EBCDIC or ASCII set • utility available for listing or copying message contents.

1201 ASCII • 94-character ASCII set, keyboard, and communication facilities for 3776 console; replaces EBCDIC capability:

$26/$22 mo	$450 prch	$0.50 maint

3951 Front Feed • allows paper insertion from both front or rear of line printer:

16/14	400	NC

1390 Audible Alarm • alarm for 3776 device error or not ready condition requiring operator intervention:

42/NA	42	0.50

4650 Keylock • disables I/O and control features of 3776 to prevent unauthorized access:

35/NA	35	NC

5450 Operator Identification Card Reader • reads magnetic stripe cards encoded in ABA format; accommodates 40 characters of which 3.7 are discretionary; each character contains 4 bits plus parity:

19/16	347	2.50

3776 Punched Card Attachments

2502 Model A1 Card Reader • 150-cpm, 80-column punched card reader • EBCDIC or ASCII code • 700-card input hopper and 600-card output stacker • cannot be used with 3501 Card Reader; requires features 3782 Model 2 and 8149:

$246/NA mo	$7,405 prch	$65.00 maint

2502 Model A2 Card Reader • 300-cpm, 80-column punched card reader • other features identical to 2502 Model A1:

309/NA	8,030	65.00

2502 Model A3 Card Reader • 400-cpm, 80-column punched card reader • cannot be used with 3776 Model 1 or 2 terminals • other features identical to 2502 Model A1:

367/NA	8,270	83.00

3501 Card Reader • 50-cpm, 80-column punched card reader • EBCDIC or ASCII code • 400-card input hopper and output stacker • cannot be used with 3776 Model 3 or 4 terminals, or 2502 Card Reader; requires feature 8050:

192/163	4,080	39.00

3521 Card Punch • 50-cpm, 80-column card punch • EBCDIC or ASCII code • 400-card input hopper and output stacker • may also function as card reader with feature 1521 on 3776 Model 1 or 2 terminals if 2502 or 3501 Card Readers are not employed • requires features 3782 Model 1 and 8150:

408/347	8,420	84.50

8050 Card Reader Attachment • required for 3501 Card Reader attachment to 3776 Model 1 or 2 terminals • cannot be used with feature 8149:

19/16	347	1.50

©1985 Data Decisions

IBM 3770 Series Data Communication Systems
Models 3771, 3774, 3775, 3776 & 3777

8149 Card Reader Attachment • required for 2502 Card Reader attachment to 3776 • cannot be used with feature 8050:

27/23	480	5.00

8150 Card Reader/Punch Attachment • required for 3521 Card Punch attachment to 3776:

27/23	480	4.50

4650 Interchangeable Feed • allows input of 51- as well as 80-column cards to 2502 Card Reader • cannot be used with feature 4651:

52/NA	1,515	20.00

4651 Interchangeable Feed • allows input of 66- as well as 80-column cards to 2502 Card Reader • cannot be used with feature 4650:

52/NA	1,515	20.00

Operator Identification Feature • reads magnetic stripe cards encoded in ABA format; accommodates 40 characters of which 37 are discretionary; each character contains 4 bits plus parity:

18/15	347	2.50

1501 Card Print • 80-position, 64-character EBCDIC or ASCII set, card edge print capability for 3521 Card Punch:

117/100	2,545	20.50

1521 Card Read/Punch Check • provides 3521 Card Punch with read and punch error check capability • card read function not supported by 3776 Model 3 or 4 on 3521 units:

102/87	2,250	59.00

☐ 3777 Communication Terminal

The IBM 3777 series consists of 4 high-speed, desk-console, line-printer, remote batch terminals. Functional differences between members of the 3777 series relate to the batch jobs that may be performed, to communications capabilites, and to associated internal memory, storage, and optional peripheral attachments. The 3777 Model 1 is functionally similar to the 3776 Model 1 or 2 terminal, and features a dual data path which allows for concurrent online and off-line operations. The 3777 Model 2 functions as a BSC multileaving workstation under the RJE facilities of a host and will support programs written for the IBM S/360 Model 20-5. The 3777 Models 3 and 4 are similar to 3776 Models 3 and 4, but have additional RJE functions and expanded I/O configurations. Under control of an RJE subsystem in the host, both the 3776/3777 can interleave up to 6 independent data streams under the multiple logical unit (MLU) protocol of SNA. Like the 3776 series, none of the 3777 terminals can be operated in an online interactive mode or be employed for keyboard data entry; console keyboard is only provided for entering terminal job commands and transmitting messages to the host processor. All 3777 models will support the attachment of diskette and card reader modules; in addition, the 3777 Model 2, 3, or 4 will support card punch and display modules, and the 3777 Models 3 and 4 can also handle magnetic tape I/O.

3777 Model 1 • keyboard console controller • dual 256-byte and 512-byte transmission buffers • requires 3203 Printer (see 3777 Printer section for particulars and pricing):

$617/$525 mo	$13,230 prch	$56.50 maint

3777 Model 2 (not in new production) • keyboard console and controller • multileaving buffer • requires 3203 Printer plus 2502 Card Reader, or 3201 Diskette and 1601 Display (see 3777 Storage, Keyboard Console, Printer, and Card Attachment sections for particulars and pricing):

704/599	15,070	65.50

3777 Model 3 • keyboard console and controller • 15K-byte definitions and procedures, and 80K-byte message storage • requires 3202 Printer (see 3777 Printer section for particulars and pricing):

1,021/869	21,840	142.00

3777 Model 4 • keyboard console and controller • 15K-byte definitions and procedures, and 80K-byte message storage • requires 3262 Model 2 or 12 Printer; second printer optional (see Printer section for particulars and pricing):

1,112/946	24,840	142.00

3777 Operations

I/O Modes—3777 Model 1 • up to 5 user-defined formats may be entered from keyboard or optional diskette and/or punched card attachments • off-line modes provide for diskette-to-printer; diskette-to-diskette; card reader-to-printer; or card reader-to-diskette operations • online batch modes provide for diskette-to-line; card reader-to-line; line-to-printer; or line-to-diskette operations • dual data path concurrent modes provide for line-to-printer operation in conjunction with either card reader-to-diskette or diskette-to-diskette operation • automatic card-to-line feature may be used to start a card reader-to-line job when an online job is completed and the 3777 goes to a standby status • I/O mode function identical to 3776 Model 1 or 2 except for the lack of card punch facility.

I/O Modes—3777 Model 2 • alternating or multileaving buffers allow for concurrent I/O device operation and job stream transmission to/from host processor; provides function necessary to execute IBM S/360 Model 20-5 workstation programs • online batch modes allow for interleaved data stream card reader-to-line with diskette-to-line transmissions, and line-to-printer with line-to-card punch reception operations • off-line keyboard-to-diskette, keyboard-to-card punch, diskette-to-diskette, diskette-to-card punch, etc, data entry and processing operations are not allowed; data set input cards or diskettes must be generated on other equipment or systems • diskette spooling capability allows for the recording and printing of system messages.

I/O Modes—Models 3 & 4 • identical to 3776 Model 3 and 4. (See 3776 Operations section for particulars.)

Buffer Operations—3777 Model 1 • identical to 3776 Models 1 and 2. (See 3776 Operations section for particulars.)

Buffer Operations—3777 Model 2 • multileaving buffer block multiplexes data streams from card or diskette readers into single data stream for transmission to host • dual buffer facilities provided for overlapped I/O operations.

Internal Storage Operations—3777 Models 3 & 4 • identical to 3776 Models 3 and 4. (See 3776 Operations section for particulars.)

3777 Storage & Magnetic Tape Attachments

Diskette Storage • 3777 Models 1, 3, and 4 may be equipped with up to 2 optional, removable diskette, 242.9K-byte storage attachment modules for the performance of various I/O modes described previously; diskette functions performed are identical to those found on the 3776 Models 1 and 2 for the 3777 Model 1, and on the 3776 Models 3 and 4 for the 3777 Models 3 and 4 • 3777 Model 2 diskette function only provides message spooling and input read capability; keyboard-to-diskette data entry applications must be performed on other equipment.

4901 Diskette Storage • first removable diskette storage module for 3777 Models 1 or 3 terminals • provides ability to pool or concatenate on data set basis for 3777 Models 3 and 4:

$105/$90 mo	$1,770 prch	$14.50 maint

4902 Diskette Storage • second removable diskette storage module for 3777 Models 1, 3, or 4 terminals • provides ability to pool or concatenate on data set basis for 3777 Model 1 • provides for automatic continuous read/write diskette operation from first to second diskette or for diskette-to-diskette copy operations on 3777 Model 1 or 3 • requires 4901 module:

105/90	1,770	6.00

1602 Console Display Spooling • removable diskette storage module for spooling of console display messages and for IPL operations on 3777 Model 2 • requires 1601 Console Display option:

121/103	2,855	13.00

3201 Diskette Input Device • removable diskette storage module for reading card data set formatted diskettes on 3777 Model 2 • may also be used for IPL operations in lieu of 1601

 ©1985 Data Decisions

IBM 3770 Series Data Communication Systems
Models 3771, 3774, 3775, 3776 & 3777

diskette feature:

140/119	3,360	13.50

Magnetic Tape • 3777 Models 3 and 4 may be equipped with magnetic tape capability for the performance of various tape-related I/O mode operations; tape formats and record parameters are identical to those of the 3776 Model 3 or 4. (See 3776 Storage & Magnetic Tape Attachments section for other particulars and for pricing of tape modules.)

7801 3411 Model 1 Attachment • attaches 3411 Magnetic Tape Unit to 3777 Models 3 and 4:

179/152	4,000	13.50

3777 Communications

3777 Model 1 Communications • half-duplex over half-/full-duplex switched (dial) line facilities in point-to-point mode, or nonswitched (private) lines in both point-to-point or multipoint modes; data rate is 2400/4800/7200/9600/19,200 bps in BSC or SNA/SDLC • other communications features identical to 3776 Model 1 or 2. (See 3776 Communications section for particulars.)

1460 SDLC/BSC Switch Control • operator switch for placing 3777 Model 1 either in SDLC point-to-point or multipoint, or in BSC point-to-point mode • BSC multipoint requires feature 1462; cannot be used with features 1461 or 1470:

$40/$34 mo	$810 prch	$5.50 maint

1461 BSC Point-to-Point • provides BSC point-to-point capability • cannot be used with feature 1460 or 1470:

21/18	504	3.00

1462 BSC Multipoint • provides BSC multipoint capability • requires feature 1460 or 1461:

19/16	347	1.00

1470 SDLC • provides SDLC point-to-point or multipoint capability • cannot be used with feature 1460 or 1461:

19/16	440	3.00

1481 Driver • communications driver without clocking • requires feature 1460, 1461, or 1470:

19/16	347	2.00

3701 EIA Interface • RS-232C interface and cable for attachment of external IBM or non-IBM modem • requires feature 1481 and external 2400-bps to 19,200-bps modem; cannot be used with feature 4501 or 4720:

19/16	462	1.00

4501 High-Speed Digital Interface • interface and cable for attachment of external 19,200-bps modem for point-to-point synchronous transmission over wideband channels • requires external modem and feature 1481; cannot be used with feature 3701 or 4720:

65/55	1,400	1.00

4720 V35 Interface • provides for direct attachment to 3705 Communications Controller for 14,400-bps transmission • requires feature 1481; cannot be used with feature 3701 or 4501:

21/18	535	2.00

3777 Model 2 Communications • half-duplex over half-/full-duplex switched (dial) line facilities in point-to-point mode, or nonswitched (private) lines in both point-to-point or multipoint modes; data rate is 2400/4800/7200/9600/19,200 bps in BSC • functions as a BSC multileaved terminal under RJE facilities of host and supports IBM S/360 Model 20-5 programs • compression/expansion features provide for trailing blank truncation, blank or data compression/expansion to enhance transmission efficiency.

1481 Driver • communications driver without clocking:

19/16	347	2.00

3701 EIA Interface • RS-232C interface and cable for attachment of external IBM or non-IBM modem • requires feature 1481 and external 2400-bps to 19,200-bps modem; cannot be used with feature 4501 or 4720:

19/16	462	1.00

4501 High-Speed Digital Interface • interface and cable for attachment of external 19,200-bps modem for point-to-point synchronous transmission over wideband channels • requires feature 1481 and external modem; cannot be used with feature 3701 or 4720:

65/55	1,400	1.00

4720 V35 Interface • provides for direct attachment to 3705 Communications Controller for 14,400-bps transmission • requires feature 1481; cannot be used with feature 3701 or 4501:

21/18	535	2.00

3777 Models 3 & 4 Communications • communications features identical to 3776 Model 3 or 4. (See 3776 Communications section for particulars.)

3701 EIA Interface • RS-232C interface and cable for attachment of external IBM or non-IBM modem • requires external 2400-bps to 19,200-bps modem; cannot be used with features 4501, 4720, 5650, or 5651:

19/16	462	1.00

4501 High-Speed Digital Interface • interface and cable for attachment of external 19,200-bps modem for point-to-point or multipoint synchronous transmission over wideband channels • requires external modem; cannot be used with features 3701, 4720, 5650, or 5651 (Model 3):

61/52	1,400	1.00

4720 V35 Interface • provides for direct attachment to 3705 Communications Controller for 14,400-bps transmission • cannot be used with features 3701, 4501, 5650, or 5651 (Model 3):

20/17	535	2.00

5650 DDS Adapter • provides for 2400/4800/9600-bps point-to-point transmission over AT&T DDS network • cannot be used with features 3701, 4501, 4720, or 5651:

35/30	840	2.00

5651 DDS Adapter • provides for 2400/4800/9600-bps multipoint transmission over AT&T DDS network • cannot be used with features 3701, 4501, 4720, or 5650:

35/30	840	2.00

3680 Encrypt/Decrypt • provides for secure transmission in conjunction with host programming facilities (Model 3):

71/60	1,600	2.00

3777 Keyboard Console

Configuration • desk console with integral keyboard (all 3777 models) • basic 3777 Model 2 console must also come configured either with 1601 Console Display and 1602 Console Display Spooling attachments, or with 2502 Card Reader attachment • 3777 Models 3 and 4 console also contains integral display monitor as standard feature • basic configurations of all 3777 models must also include separate, cable-attached 3203 Model 3 Printer. (See initial 3777 section for model pricing and respective 3777 component sections for pricing and particulars on printer or card attachments.)

1601 Console Display • 3777 Model 2 attachment providing display capability for operator messages and keyboard commands • 1024 characters at 16-line x 64-character format; 14 lines for messages and 2 lines for keyboarded input display • 64-character EBCDIC set:

$188/$135 mo	$3,780 prch	$28.50 maint

3777 Models 3 & 4 Console Display • standard attachment providing display capability for terminal-host messages, host input, and prompt or status information • 1024 characters at 16-line by 64-character format; 13 lines for host-terminal messages; 3 lines for status and prompt • 64-character EBCDIC or ASCII set • utility for listing or copying message contents.

1201 ASCII • 94-character ASCII set, keyboard, and communications facilities for 3777 Model 1, 3, or 4 consoles (3777 Model 2 is EBCDIC-only); replaces EBCDIC facilities on 3777 Models 1, 3, or 4:

26/22	450	0.50

©1985 Data Decisions

IBM 3770 Series Data Communication Systems
Models 3771, 3774, 3775, 3776 & 3777

1390 Audible Alarm • alarm for 3777 Model 3 device error or not ready condition requiring operator intervention:

42/NA	42	0.50

4650 Keylock • disables I/O and control features of 3777 to prevent unauthorized access:

36/NA	36	NC

5450 Operator Identification Feature • reads magnetic stripe cards encoded in ABA format; accommodates 40 characters of which 37 are discretionary; each character contains 4 bits plus parity:

19/16	347	2.50

3777 Printer

3203 Model 3 Printer • standalone console line printer required on all 3777 terminal models • 1000/870/530 lpm with 48/60/120-character sets; removable print train impact mechanism • 48/52/60/63/120-character EBCDIC or ASCII sets • 132 columns at 10 cpi • 6 or 8 lpi • 3.5- to 20-inch forms tractor feed • 3- to 24-inch long continuous forms:

$1,346/$1,316 mo	$29,950 prch	$324.00 maint

6360 Speed Enhancement • provides 1200/1020/585 lpm capability with 48/60/120-character sets • requires feature 5595 on 3777 terminal:

79/67	2,080	NC

3262 Model 2 Printer • standalone console line printer; Model 2 or 12 required on 3777 Model 4; second printer optional • 650/467/364/253 lpm with 48/64/96/128-character sets • interchangeable print bands • EBCDIC character sets • 132 columns at 10 cpi • 3/4/6/8/ lpi • up to 16-inch continuous-feed forms:

637/541	15,040	193.00

3262 Model 12 Printer • same as 3262 Model 2, except for print speeds: 325/230/180/125 lpm with 48/64/96/128-character sets:

468/398	12,620	141.00

Model 2 to 12 Upgrade:

NA/NA	7,040	NA

5450 OCR Print Feature • provides 48-character print band:

119/101	3,990	40.00

1090 Audible Alarm • sounds when Bell Code or check indicator received:

6/5	201	NC

6302 Printer Attachment • attaches second printer to 3777 Model 4:

21/18	525	1.00

3777 Punched Card Attachments

2502 Model A1 Card Reader • 150-cpm, 80-column punched card reader • EBCDIC or ASCII code • 700-card input hopper and 600-card output stacker • requires feature 8002:

$246/NA mo	$7,405 prch	$65.00 maint

2502 Model A2 Card Reader • 300-cpm, 80-column punched card reader • other features identical to 2502 Model A1:

309/NA	8,030	65.00

2502 Model A3 Card Reader • 400-cpm, 80-column punched card reader • other features identical to 2502 Model A1:

367/NA	8,270	83.00

3521 Card Punch • 50-cpm, 80-column card punch • EBCDIC or ASCII code • 400-card input hopper and output stacker • not supported by 3777 Model 1 • requires features 3782 Model 1 and 8150:

408/347	8,420	84.50

8002 Card Reader Attachment • required for 2502 Card Reader attachment to 3777:

44/38	1,050	3.50

8150 Card Punch Attachment • required for 3521 Card Punch attachment to 3777 Model 2 or 3:

28/24	480	4.50

4650 Interchangeable Feed • allows input of 51- as well as 80-column cards to 2502 Card Reader • cannot be used with feature 4651:

52/NA	1,590	20.00

4651 Interchangeable Feed • allows input of 66- as well as 80-column cards to 2502 Card Reader • cannot be used with feature 4650:

52/NA	1,590	20.00

1501 Card Print • 80-position, 64-character EBCDIC or ASCII set, card edge print capability for 3521 Card Punch:

117/100	2,545	20.50

1521 Card Read/Punch Check • provides 3521 Card Punch with punch check capability • card read capability supplied by this feature on 3521 is not supported by 3777 terminals:

102/87	2,250	59.00

• END

©1985 Data Decisions

IBM 3800 Series Modems
Models 3833, 3834, 3863, 3864, 3865 & 3868

■ PROFILE

Function • high-performance modems with network control and management capabilities for switched or dedicated facilities.

Communications/Networks • synchronous 2400/4800/9600-bps, point-to-point and multipoint communication over 2-/4-wire, switched/dedicated Type 3002, unconditioned facilities; C1/D1/D2 conditioning recommended for 9600-bps operation • non-AT&T compatible • designed for use in SNA and non-SNA IBM distributed networks.

First Delivery • March 1980 (3863, 3864, 3865); April 1984 (3868); February 1985 (3833 and 3834).

Units Delivered • unknown.

Comparable Systems • other vendor models with similar centralized network management capabilities such as AT&T-IS Dataphone II; Infinet NCM and DMX Series; Paradyne MPX/VHS Series; Racal-Milgo Omnimode Series; Codex CS and 2600 Series.

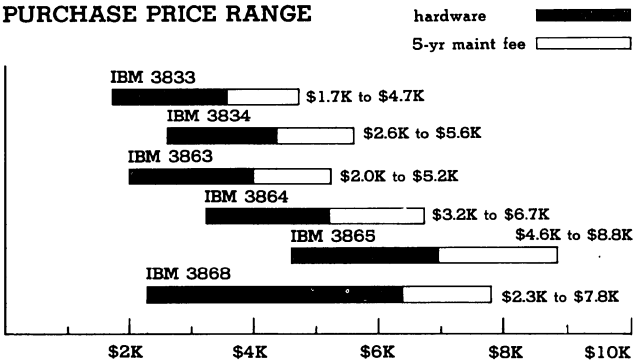
Vendor • International Business Machines (IBM Corporation); National Accounts Division, 1133 Westchester Avenue, White Plains, NY 10604; 914-696-1900 • National Marketing Division, P.O. Box 2150, Atlanta, GA 30055; 404-238-2000.

Canada • IBM Canada Limited; 3500 Steeles Avenue East, Markham, ON L3R 2Z1 • 416-474-2111.

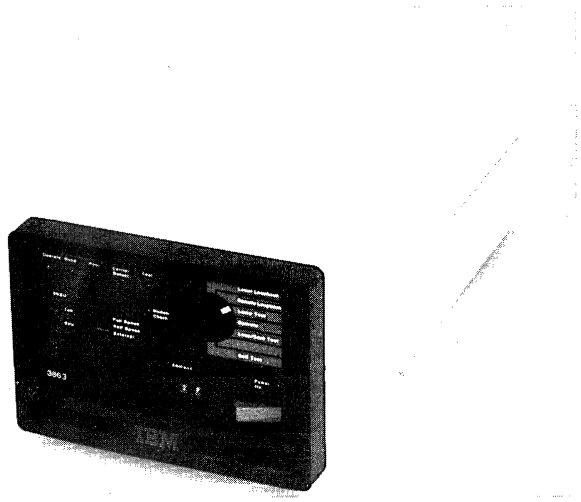
Distribution • worldwide via local IBM sales/service offices.

GSA Schedule • listed.

PURCHASE PRICE RANGE



IBM 3800 SERIES PURCHASE PRICING bar graphs cover price ranges between "small" and "large" configurations for hardware (solid bars) and for associated 5-year period maintenance fees (open bars) • **IBM 3833 small** configuration consists of 2400-bps 3833 Model 1 modem with standard extended diagnostics; **large** of 2400-bps 3833 Model 1 modem with 7953 switched network and 3901 fan-out • **IBM 3834 small** configuration consists of 4800-bps 3834 Model 1 modem with extended diagnostics; **large** of 4800-bps 3834 Model 1 modem with 7953 switched network and 3901 fan-out • **IBM 3863 small** configuration consists of 2400-bps 3863 Model 1 modem; **large** of 2400-bps 3863 Model 1 modem with 7953 switched network, 3901 fan-out and 7930 extended diagnostics feature • **IBM 3864 small** configuration consists of 4800-bps 3864 Model modem; **large** of 4800-bps 3864 Model 1 modem with 7953 switched network, 3901 fan-out, and 7930 extended diagnsotics feature • **IBM 3865 small** configuration consists of 9600-bps 3865 Model 1 modem; **large** of 9600-bps 3865 Model 1 modem with 3260 multiplexer, 7953 switched network, and 7930 extended diagnostics feature • **IBM 3868 small** configuration consists of 2400-bps 3868 Model 1 modem; **large** of 9600-bps Model 3 modem with 3260 multiplexer and 7953 switched network feature.



■ ANALYSIS

The IBM 3800 Series of high-peformance modems comprises the aging 3860 product line and the new, compact 383X modems. The 3860 Series represents a mature product line that has experienced no major enhancements since the last revision of this report. However, purchase prices for low-end medium-speed models 3863 and 3864 have been lowered by 13 to 29 percent while purchase prices for high-end models 3865 and 3868 have been reduced by 8 to 12 percent. IBM has also announced the withdrawal of the 28-day trial plan and the rental option for the IBM 3863, 3864, 3865, and 3868 modems along with the 3866 multimodem enclosure.

In addition, IBM has recently introduced compact versions of models 3863 and 3864 that are reportedly 35 percent smaller, 40 percent lighter, and cost less than their 3860 counterparts. Dubbed Models 3833 and 3834, these general-purpose modems are based on extended LSI circuit design, yet offer the same functional characteristics as their 3860 complements except for the inclusion of Extended Diagnostics as a standard feature. The new 3830 modems are also fully compatible with 3868 rackmount modems and like all 3860 models, support IBM associated network control software.

Last year, IBM overhauled its Network Problem Determination Application (NPDA) software by expanding its Link Problem Determination Aid (LPDA) function. The LPDA function was enhanced to provide network status information and problem identification over multiplexed circuits and tail circuits and to support received signal level reporting from both central and remote modems. At that time, the required ACF/NCP software wasn't available that prevented the sending of extended LPDA information to a central NPDA facility for analysis. This problem was later resolved and all improved LPDA capabilities are now supported by ACF/NCP Version 3.

While modems capable of running diagnostic routines and then transmitting the results to a central collection point are not new, the use of one's existing computer facilities to gather, analyze, and display those results is. Most other communication vendors offering such centralized network management require

 ©1985 Data Decisions

IBM 3800 Series Modems
Models 3833, 3834, 3863, 3864, 3865 & 3868

specialized hardware at the central site dedicated to this function. IBM does not; however, host performance can be adversely affected by the added demands of network management.

IBM's forte, of course, is computers, and until the announcement of the 3860 Series modems, the user's control in IBM distributed networks essentially stopped at the RS-232C interface. The modems, and corresponding software packages that work with them, represented a thrust by IBM into the communications realm. They permit IBM customers to centrally monitor and control their networks right up to, and through, the communications carrier.

When properly configured in an SNA network, IBM's diagnostic modems permit users to amass and analyze the results of remotely executed diagnostic routines at a central site. This capability, referred to as the Link Problem Determination Aid (LPDA), works with the Network Problem Determination Application (NPDA) software product. NPDA initiates tests, collects results, provides the network manager with both itemized and summary results, and attaches a probable cause to detected incidents of network errors. NPDA also uses the modem data to provide alert messages based on a user-specified threshold error rate. NPDA also collects and analyzes event and statistical information from tape and DASD devices.

Three basic modem models are available, each designed for different voice-grade data rates of 2400, 4800, and 9600 bps. The high-speed model also comes with a multiplexing option permitting up to 4 lower-speed channels to share a single modem. All the models offer a backup transmission capability at half the normal data rate (i.e., 1200, 2400, or 4800 bps). For communications reliability, all models also offer dial network backup as an option.

The modems are designed for dedicated-line operation; 2400-/4800-bps models can be used on the switched DDD network as well. The dedicated line models are designed especially for point-to-point or multipoint operation. IBM maintains that all models can operate over unconditioned 3002 Series leased lines, although the 9600-bps version, in order to prevent unacceptably high error rates, may require D1 conditioning for point-to-point operation or C1/D2 conditioning for multipoint configurations.

☐ Strengths

The IBM 3800 Series modems are competitively priced, especially when one considers that special central-site hardware is not required. Other vendors offer centralized network management akin to the features offered by IBM, but they invariably require either a dedicated processor or console, or both. Except for a battery of relatively inexpensive communications software products, no dedicated hardware is required with the IBM modems as long as the rest of the network is also IBM.

Users will benefit from the addition of the newer 383X models to the IBM model line-up. As cost-effective alternatives to their 386X predecessors, the new entries feature a sleeker design and incorporate Extended Diagnostics as a **standard** feature. In addition, the 383X models are fully compatible with 3863, 3864, and 3868 modems. In the same vein, all IBM modem models are particularly well integrated into the IBM product line. The data rates and configurations supported seem to be ideally suited for IBM 3270-type networks. Again, this may be viewed as either an advantage or disadvantage, depending on the degree of IBM product penetration at the user site.

The modems offer particularly flexible diagnostics capabilities, attractive both to users with limited data communications expertise as well as seasoned network professionals. Tests may be run automatically or manually, locally, or remotely. Results may be interpreted by the network manager, or by the NPDA software for noncommunications-oriented managers. In addition, an optional extended diagnostics board is available for signaling power losses at remote modems. This extended diagnostics board is a standard feature on the new 3833, 3834, and 3868 modems.

The 3868 rackmounted modems are compact units providing significant space saving in user equipment racks. Different units can be mixed or matched in the same rack enclosure. 3868 modems are provided with a 3-year warranty, one of the longest in the industry.

All remotely retrieved diagnostic and status data, whether manually or automatically initiated, is transmitted in-band; that is, the same data path and control is used as for user data. Status and test information is interspersed with user data transmissions without interfering with terminal-to-host sessions. This can be viewed as a more reliable diagnostics retrieval method than when separate side-channels are used, especially on unconditioned lines.

☐ Limitations

IBM 3860 Series modems are designed for use in SNA networks. In order to take advantage of the remote diagnostics features, the user must have at least one IBM 3705/3725 Communications Controller running ACF/NCP, Release 2.1 or above. The IBM System/36 System Support Program also supports 3860 Series remote diagnostics (see Overview). IBM maintains that the modems may still be implemented in pre-SNA or non-SNA networks, but to do so requires that all status and diagnostics testing be conducted locally, without a storage or hardcopy capability for results—a severe limitation.

The in-band approach used by IBM to monitor network performance and perform diagnostics adds overhead to normal data communication, reducing throughput. Most of IBM's competitors employ an out-of-band secondary channel technique which doesn't interfere with normal data throughput.

Failure recovery is hampered by the absence of a hot-spare modem switch in the IBM product line. In other words, there is no provision to switch over to a hot-spare (standby) unit when an IBM modem fails. IBM depends on its field maintenance to handle modem failures quickly, but the user is still faced with a mean time-to-repair which is intolerable for some networks.

Threshold parameters indicating marginal or failed network components are established by IBM, and are not open to user manipulation as in systems marketed by Infinet and Codex, among others. The IBM modem user (with NPDA) has only the limited ability to specify error-to-number-of-transmissions ratio, a figure which sets the tolerable error limit for the network. IBM does not measure analog line parameters, except for received signal quality, which would alert network operators more quickly to degrading line conditions and exactly pinpoint those conditions. Competing systems, the Codex DNCS, and Paradyne ANALYSIS in particular, are armed with a battery of measurements for analog parameters such as phase jitter, drop outs, and harmonic distortion.

There are some severe limitations to the IBM approach to network control that deserve strong user consideration. NPDA will not extend through a standalone multiplexer or other kind of node, except for IBM 3705/3725 front ends or other IBM "downstream processors." Also, the software support for X.25-based packet networks will permit users to carry SNA traffic over such public networks, but does not permit NPDA to retrieve diagnostics or status data over packet-switched links.

Remedial recovery through dial backup is an option available on all models, but there are limiting considerations. In some cases, dial backup may require half-speed transmission. Also, dial backup may be used to connect any tributary station to the control station in a multipoint arrangement, but the control station is cut off from the other tributaries when operating in dial backup mode.

■ HARDWARE

☐ Terms & Support

Terms • effective April 1, 1985, new orders for IBM modems will be available from IBM on a purchase basis only • installed lease and rental units are not affected by this announcement and customers with installed lease or rental models can continue to order features previously offered under lease or rental terms • separate maintenance contract available for purchased units; billed on an annual basis only effective May 1, 1983; 3-month initial period of maintenance free of charge (3 years free of charge on 3868 rackmount modems); rental pricing includes

 ©**1985 Data Decisions**

IBM 3800 Series Modems
Models 3833, 3834, 3863, 3864, 3865 & 3868

maintenance • quantity discounts for modems purchased under Volume Procurement Amendment (VPA) effective December 13, 1982; new discounts are 6% for 5 to 9 units, 9% for 10 to 24 units, 15% for 25 to 49 units, 20% for 50 to 99 units, 25% for 100 to 199 units, and 30% for 200 units or more • lease/rental modems qualify for new discounts if purchased under VPA on or after effective date and on or before March 30, 1984; modems shipped under VPA prior to December 13, 1982, will receive old discount (25 to 49 units, 6%; 50 to 89, 9%; 90 to 149, 12%; 150 or more, 15%), but will count toward total quantity of units for future purchases during customer's contract period (18 months from commencement date) • no educational allowances • 3-month warranty; 3-year warranty on 3868 models.

Support • modems are designated for customer set-up; designed to be installed, moved, and reconfigured without IBM service personnel assistance; maintenance provided free, 24 hours per day, 7 days per week for first 3 months (first 3 years, 3868 rackmount models) • all options and features are field installable.

☐ Overview

The IBM 3800 Series modems are microprocessor based and contain programming in ROM which permits extensive diagnostics and reporting capabilities. Models 3863 and 3833 operate at 2400 bps with a backup speed of 1200 bps. Models 3864 and 3834 operate at 4800 bps with a backup speed of 2400 bps. Model 3865 operates at 9600 bps with a backup speed of 4800 bps. All models except for the 3833 and 3834 come in 2 versions: one primarily for point-to-point applications only; the other for point-to-point or multipoint operation. Models 3833 and 3834 are only available in one version that supports point-to-point or multipoint operation.

Model 1 of the 3863 and 3864 and Models 3833 and 3834 operate in half- or full-duplex mode over 4-wire dedicated facilities, either point-to-point or multipoint. If multipointed, these modems can serve as either the control station or a tributary station. Model 2 of the 3863 and 3864 operates only in point-to-point mode, half-duplex, over 2-wire switched (DDD) facilities.

The 9600-bps 3865 modem requires all 4-wire dedicated facilities. The Model 1 operates only in point-to-point mode, while the Model 2 runs in either point-to-point or multipoint configurations.

A special multiplexing feature is available with the 3865 Model 1, which permits up to 4 subchannels, operating at either 4800 or 2400 bps, to share the same dedicated point-to-point facility. The multiplexer provides up to 4 EIA or CCITT interfaces; attached devices may be local, or remotely attached on tail circuits. Models 3833, 3834, 3863, or 3864 modems may be used for such tail circuits. Each multiplexer channel has its own buffers to compensate for timing variations between tail-circuit modems and the 3865 clock.

The 3868 rackmount modems, housed in a 3866 Multimodem Enclosure, are compatible with their standalone counterparts except for the inclusion of Extended Diagnostics as a standard feature. The 4 3868 models are compatible and can communicate with the 3863 Model 1, 3864 Model 1, and 3865 Models 1 and 2 modems, respectively, with up to 72 units mounted in a standard equipment cabinet. The 3868 modems are based on newer technology and require less rack space than previous shelf-mounted 3860 standalone modems. They also come with a 3-year warranty compared to the 3-month warranty for older models.

All of the modem models feature automatic remote speed selection between the primary and fallback operating speeds, an anti-streaming feature which prevents any one terminal from occupying a multipoint facility too long, automatic and adaptive equalization, auto-answer for DDD networks or dial backup operations, and the ability to accept timing from an external device (in lieu of its own clock). A customer switch permits the user to alter each modem between a 24-millisecond Ready-For-Sending delay (in multipoint operations) or a 60-millisecond delay.

Diagnostic testing may be performed manually or automatically under software control. The modem operator panel permits the user to conduct a modem self-test of microcode, line transmit and receive tests, local and remote loopback tests, end-to-end loop tests without remote operator assistance, and a lamp test of indicator lights. Automatic, centralized diagnostics require a battery of software products running on the central processor. The required products are: ACF/NCP Version 3 in a suitably configured 3705/3725 Communications Controller, the Network Communications Control Facility (NCCF) Version 2, Release 1, and the Network Problem Determination Application (NPDA) Version 2 or Version 3. Users of IBM System/36 computers with System Support Program (5727-SS1) can also utilize the online problem determination facility for 3860 Series modems. Using online problem determination, the System/36 operator can invoke diagnostic tests from an operator console.

NPDA uses the modem's diagnostics features for the collection, storage, and retrieval of network error and management data, and contains the logic for determining the probable cause of network errors. The probable causes of problems will identify faults in the communications controller, line, modem, modem interface, or terminal. NCCF supports operator control of the network, and provides itemized and summary formatting of NPDA data.

Switched or dial network backup is an optional feature available with all the modem models. Two 2-wire phone lines are required. Calls are placed manually. When one connection is made, the operator has 4 minutes to establish connection on the second line. Otherwise, an automatic time-out will disconnect the first line.

The IBM modems use standard 120-volt AC 60-Hz power. Cables for attachment to devices are not offered (usually provided with terminal communications adapter), but cables for modem attachment to the communications facility are included. Cable length is 25 feet, and may be terminated with a 4-prong plug, with 4 spade lugs, or a 50-pin connector.

Other options and accessories available with the IBM modems include a "fan-out" feature, which permits up to 3 attached devices to alternately share the modem, rackmount adapters, and an extended diagnostic card, which provides an indication of remote modem power loss. The fan-out feature may not be employed with the multiplexing feature on the 3865, nor may it be used with external timing.

☐ Packaged Modems

Basic standalone units; includes cables for attachment to communications facilities, operator panel with status and data quality indicators • FCC approved for attachment to switched public DDD network.

3833 Model 1 Modem • 2400-bps synchronous modem, 1200-bps fallback speed • half-/full-duplex operation over 4-wire dedicated facilities • point-to-point or multipoint configurations • standard Extended Diagnostics feature:

$1,700 prch	$120 maint

3834 Model 1 Modem • 4800-bps synchronous modem, 2400-bps fallback speed • half-/full-duplex operation over 4-wire dedicated facilities • point-to-point or multipoint configurations • standard Extended Diagnostic feature:

2,600	132

3863 Model 1 Modem • 2400-bps synchronous modem, 1200-bps fallback speed • half-/full-duplex operation over 4-wire dedicated facilities • point-to-point or multipoint configurations:

1,950	97

3863 Model 2 Modem • 2400-bps synchronous modem, 1200-bps fallback speed • half-duplex operation over 2-wire switched facilities • CCITT V.26 bis compatible • point-to-point configurations only:

2,075	114

PRCH: purchase price. MAINT: annual maintenance charge for purchased units; initial 3-month period maintenance free of charge, Models 3833, 3834, 3863, 3864, 3865; initial 3-year period maintenance free of charge, Model 3868. NA: not applicable/available. NC: no charge. Prices are current as of February 1985.

©1985 Data Decisions

IBM 3800 Series Modems
Models 3833, 3834, 3863, 3864, 3865 & 3868

3864 Model 1 Modem • 4800-bps synchronous modem, 2400-bps fallback speed • half-/full-duplex operation over 4-wire dedicated facilities • point-to-point or multipoint configurations:

3,200	148

3864 Model 2 Modem • 4800-bps synchronous modem, 2400-bps fallback speed • half-duplex operation over 2-wire switched facilities • CCITT V.27 ter compatible • point-to-point configurations only:

3,400	160

3865 Model 1 Modem • 9600-bps synchronous modem, 4800-bps fallback speed • full-duplex operation over 4-wire dedicated facilities • CCITT V.29 compatible • point-to-point configurations only • supports multiplexing feature:

4,650	217

3865 Model 2 Modem • 9600-bps synchronous modem, 4800-bps fallback speed • full-duplex operation over 4-wire dedicated facilities • CCITT V.29 compatible • multipoint configurations only:

4,650	217

6240 Shelf Adapter • available with all models • holds 2 modems side-by-side in standard 19-inch EIA rack:

80	NC

☐ Rackmount Modems

Rackmounted modems are compatible with their standalone counterparts but include Extended Diagnostics as a standard feature; all are contained in the 3866 Multimodem Enclosure.

3868 Model 1 Modem • compatible with standalone modem 3863 Model 1:

$2,350 prch	$102 maint

3868 Model 2 Modem • compatible with standalone modem 3864 Model 1:

3,000	150

3868 Model 3 Modem • compatible with standalone modem 3865 Model 1:

4,300	162

3868 Model 4 Modem • compatible with standalone modem 3865 Model 2:

4,300	162

Rackmount Enclosures

Rackmount modems are housed in 3866 Model 1 or Model 2 Multimodem Enclosures. The enclosures are pre-wired for power, DTE, and communication cables and connectors, so that 3868 modems can be inserted or removed without changing individual cabling.

3866 Multimodem Enclosure Model 1 • card cage accommodates up to 12 3868 Model 1 modems; up to 6 3868 Models 2, 3, and 4 modems; or mixed combinations in the same enclosure • fits standard 19-inch equipment cabinet; up to 6 enclosures per standard 6-foot cabinet • requires 3950 Fan Unit and 5210 Power Unit:

$485 prch	$108 maint

3866 Multimodem Enclosure Model 2 • card cage accommodates identical modem contingent as Model 1, but installed in a freestanding (tabletop) IBM minicabinet • requires 3950 Fan Unit and 5210 Power Unit:

1,020	108

3950 Fan Unit • provides cooling for freestanding/single 3866 enclosure; single 3950 unit can be shared by 2 adjacent 3866 Model 1s housed in an equipment cabinet:

465	NA

5210 Power Unit • provides power for each 3866 Model 1 or Model 2 enclosure • 1 power supply per enclosure:

1,560	NA

☐ Application

Point-to-point or multipoint synchronous communication over unconditioned 4-wire dedicated voice-grade facilities, or 2-wire switched facilities in point-to-point mode only • modems utilize SDLC or BSC line controls • with 9600-bps Model 3865, D1 conditioning may be required for acceptable error rates in point-to-point configurations; C1 or D2 conditioning may be required in multipoint configurations • may serve as control station or tributary station in point-to-point arrangements • customer selectable RTS/CTS delay • 8.5 (prime) or 25 (opt) milliseconds for 3863 Model 1 and 3833 as multipoint tributary; 150 (prime) or 75 (opt) milliseconds for 3863 Model 2 or DDD network • 24 (prime) or 60 (opt) milliseconds for 3864 Model 1, 3834, and 3865 • 170 (prime) or 50 (opt) milliseconds for 3864 Model 2 on DDD network.

☐ Operating Parameters

All models designed for synchronous transmission; depending on model, data rates are 2400, 4800, or 9600 bps with half-speed fallback • Models 3833, 3834, 3863, and 3864 may be configured as tail circuit modems on 3865 equipped with multiplexing feature; 3833, 3834, 3863, and 3864 support either 4-wire dedicated or 2-wire switched facilities • all models feature automatic remote speed detection between primary and fallback data rates, and automatic adaptive equalization • DPSK (scrambled) modulation for Models 3833, 3863, and 3864 Model 2, and for Models 3834 Model 1 and 3865 operating at half speed; QAM modulation for Models 3864 Model 1, 3834, and 3865 operating at full speed • operating mode options for 3863 Model 2, CCITT V.26 bis; for 3864 Model 2, CCITT V.27 ter; and for 3865, CCITT V.29.

☐ Channel Functions

Modems are single-channel, except that the 9600-bps Model 3865 and 3868 may be configured with a multiplexing feature supporting up to 4 channels; all models (except 3868 rackmount models) also support a fan-out feature and switched network backup feature.

3260 Data Multiplexer (3865 Model 1 & 3868 Models Modem Only) • supports up to 4 2400-bps or 4800-bps subchannels • required for tail circuit extensions; may not be employed with fan-out feature • field installable:

$1,075 prch	$29 maint

8547438 Tail Circuit Attachment • allows Model 1 only 3833, 3834, 3863 and 3864 modems to attach to 3865 multiplexing feature • mutually exclusive with fan-out feature • 1 per tail circuit modem required • field installable:

52	NC

3901 Fan-Out Feature • allows up to 3 devices to share modem 1 at a time • available with all modem models • mutually exclusive with multiplexer feature; uses internal clocking only • field installable:

804	12

Digital Interface • EIA RS-232C/CCITT V.24/V.28 • 25-pin electrical connector.

☐ Control Functions

FCC Registered Modems • modems 3863 and 3864 Model 2 designed for use over the DDD network are FCC registered for direct connection under FCC Rules Part 68 • do not require separate Data Access Arrangement (DAA) • standard feature included in modem pricing:

NC prch	NC maint

Failure Recovery • provides immediate recovery from line failures • switches modems at attended or unattended sites between 4-wire dedicated line and 2 dial-up lines to restore communication interrupted by line failure/degradation • switches modem to a lower data rate to restore communication interrupted by line degradation • disables modem when communication becomes monopolized on a multipoint line by streaming terminal; i.e., terminal Request-To-Send (RTS) is on for over 30 seconds.

7953 Switched Network Backup • provides backup for modems employing dedicated facilities • requires 2 2-pair telephone wires • provides point-to-point connections only, but

©1985 Data Decisions

IBM 3800 Series Modems
Models 3833, 3834, 3863, 3864, 3865 & 3868

may be employed as backup in multipoint configurations with limitations; calls must be manually placed; may require that transmission be reduced to half-speed • field installable:

1,180	63

Anti-Streaming • integral switch-selectable option on multipoint modems only; automatically disconnects transmission upon terminal streaming condition, when terminal Request-To-Send (RTS) is up for over 40 seconds • standard feature, 3863/3864 Model 1 modem, 3833/3834, and 3865 Model 2 modem:

NC	NC

☐ Diagnostics & Status Indicators

Wide range of diagnostic and testing features are standard with modem series. They include manual or centralized control. Remote diagnostics requires SNA network configuration and several software products, and may not be run from modems on tail circuits or those on terminal end of packet-switched network links. Local tests, performed via operator panel, include modem self-test, line transmit and receive tests, local and remote loop-back tests, and lamp test of indicator lights. Extended diagnostic board for signaling power loss available with all models.

7930 Extended Diagnostic Card • provides power loss indication for remote modem, detects loss of DC power in remote modem, and signals with out-of-band transmission to local modem • standard feature on 3868 rackmount modems; must be installed in both local and remote standalone modems at extra cost; field installable:

$295 prch	$12 maint

4791 LPDA Function on Tailed Link • provides network status information and problem identification on tail circuits • available for 3833, 3834, 3863 Model 1, 3864 Model 1, 3868 Model 1, and 3868 Model 2 modems:

375	12

• END

©1985 Data Decisions

IBM 4300 Series Distributed (SSX/VSE) Computer Systems

Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

■ PROFILE

Function • standalone or distributed data processing system for commercial applications; 4361 models also designed for scientific and math-oriented applications.

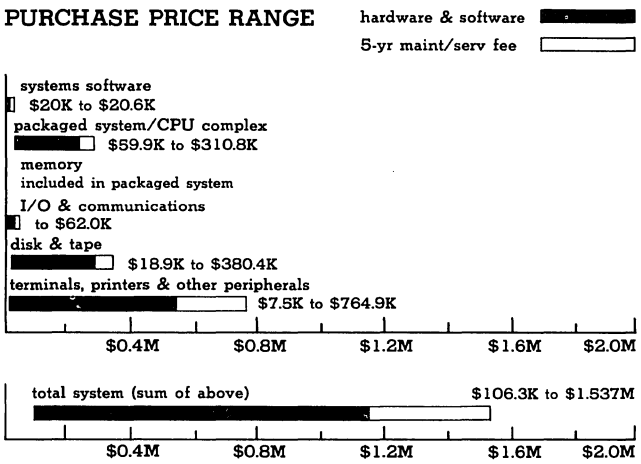
Architectures Supported • Systems Network Architecture (SNA) • ACF/VTAME access method combines capabilities of ACF/VTAM (running on host) and ACF/NCP/VS (running on front-end communications processors) to support integrated communications adapter • can support 3705 but not recommended primarily because of cost; the 3725 is currently not supported on SSX/VSE systems.

Communications • asynchronous start-stop (SS) BSC, and Synchronous Data Link Control (SDLC) protocols • support 8 communication lines; data rates up to 9600 bps per line on adapter can support higher rate but not on all lines; first line aggregate data rate limited to 64K bps.

Operating Systems • DOS/VSE; SSX/VSE; VM/SP; VM/BSE primary operating systems • DOS R.26 and DOS/VS R.34 can run but are not supported • MVS available for 4361-5 only.

Database Management • DL/1 under SSX/VSE, DOS/VSE, VM/SP, or VM/BSE • IMS under MVS or VM • DB2 under MVS.

PURCHASE PRICE RANGE



IBM 4300 SERIES PURCHASE PRICING bar graphs illustrate price ranges for small to large systems with solid bars reflecting 5-year software licensing (or purchase pricing) and hardware purchase pricing and open bars reflecting 5-year service/maintenance fees associated with large system • **SMALL SYSTEM** is based on 4361-3 packaged system (includes CPU, 2M-byte memory, disk (DASD) adapter/8809, tape adapter, display/printer adapter, and 3-line communications adapter) and the following options: console, SSX/VSE software, 64M-byte disk, 9-track tape drive, console terminal, and system printer • **LARGE SYSTEM** is based on 4361-5 packaged system (includes CPU, 12M-byte memory, disk/tape adapter, display/printer adapter, and 8-line communications adapter) with the following options: console; SSX/VSE software console; 2000-lpm system printer; 4.5G bytes of disk storage; 6 9-track tape drives; 100 remote keyboard/display terminals, with 12 printer terminals connected to system through 4 3274 control units connected to integrated communications adapter through 9600 bps data communication links; and 31 local terminals (20 3278-2 Displays, 4 terminal printers, and 5 3270-PCs) connected to system through Display Printer Adapter and Work Station Adapter.

Transaction Processing Management • primarily through CICS/DOS/VS 1.5.0 which operates as a TP monitor to interface terminals to application programs in the host, such as DL/1 or IMS database management system.

Support Software • assembler, BASIC, Pascal, COBOL, FORTRAN IV, APL, RPG-II, and PL/1.

Processors • 4321 and 4331-11 replace Model 4331-1; 4361-3 essentially replaces 4321, 4331-2, and 4331-11 • all are 32-bit processors (except 4361-4/-5 models use 64-bit with data paths); attachments primarily via integrated adapters; 4331-2/-11 and 4361-3/-4/-5 also have I/O channels; 4321 and 4331-11 can attach loops • 4321, 4331-11, and 4361-3 include many features in basic system package • maximum aggregate I/O data rate of 500K (4321), 1.25M (4331-11), 3.7M (4331-2), 10M (4361-4), and 11M (4361-5) bytes per second • estimated processor power is 0.20 MIPS for 4321; 0.30 MIPS for 4331-11; 0.42 MIPS for 4331-2; 1.0 MIPS for 4361-4; and 1.3 MIPS for 4361-5 • 1M-byte memory for 4321; 1M to 4M bytes for 4331-2/-11; and 2M to 12M for 4361-4/-5 • practical limits of 1.1G-byte disk for 4321, 9G bytes for 4331-11; 35G bytes for 4331-2; and 120G bytes for 4361-4/-5 • 400- and 625-lpm printer models; 2000-lpm models on 4361 • satellite 3800 printer support to 20,040 lpm on 4331/4361 models.

Terminals/Workstations • rule of thumb limits for local/remote terminal support are 20 for 4321; 60 for 4331-11; 100 for 4331-2; and 400 for 4361.

First Delivery • 1980 for 4331; 1982 for 4321, 4331-11; 1984 for 4361-4/-5; December 1984 for 4361-3.

Systems Delivered • approximately 30,500 worldwide of all 4300 models as of January 1984.

Comparable Systems • compatible PCM systems include Cambex 1600, IPL 4400, Magnuson M80, NAS 6600, Nixdorf 8890 • 32-bit superminis, small business systems, and byte-oriented mainframes of comparable power but different operating software include Burroughs B 1900 to B 6900 and B 2900 to B 4900; Data General MV ECLIPSE series, DEC VAX-11, Gould SEL Concept 32; Harris 600/700/800 Series; Hewlett-Packard HP 3000; Honeywell DPS 6 and DPS 7; IBM System/38; NCR V8500 and V8600; Perkin-Elmer Series 3200; Prime Series 50; Wang VS Series.

Vendor • International Business Machines (IBM) Corporation, Information Systems Group • National Accounts Division; 1133 Westchester Avenue, White Plains, NY 10604; 914-696-1900 •

 ©**1984 Data Decisions**

IBM 4300 Series Distributed (SSX/VSE) Computer Systems
Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

National Marketing Division; 4111 Northside Parkway, Atlanta, GA 30327; 404-238-2000.

Distribution • worldwide via local IBM sales/service offices.

■ ANALYSIS

The 4321 and 4331-2/-11 computer systems are small 32-bit mainframes aimed at both small business processing and distributed processing. The 4321 and 4331-11 were introduced in November 1981 for first installation in March 1982. They replace the 4331-1, which was introduced along with 4341 in January 1979 as the original models of the 4300 series. 4331-1 was withdrawn in November 1981. The 4321 and 4331-11 are limited new production as of September 1984.

Basically, the 4361-3 is now the entry-level system into the 4300 line. All 4300 models can run one or more versions of operating systems from the evolving DOS/VS/VSE and VM/SE/BSE/SP product lines. The 4321, 4331-11, 4341, and 4361 models can run the prompter-supported SSX/VSE packaged version of DOS/VSE. The OS/VS1 is not supported on the 4321 and 4331-11 models.

From the time it was introduced in January 1979, the 4300 series has been characterized by 2 distinct architectural groups. The original low-end 4331-1, the 4331-2, and the later 4321 and 4331-11 processors utilize a CPU-controlled processor architecture that requires cycle-stealing I/O operations, exhibits heavy orientation toward integrated I/O adapters and fixed block DASD, and adds a wide variety of auxiliary attachment methods, including S/370-type channels and 8100-type loops. The original 4341-1 and all its successors, on the other hand, provide more functional distribution and simultaneous operations in internal CPU logic but stick to the channel-oriented I/O subsystem organization familiar to users of IBM's medium and large S/370 systems.

The 4361 models are bridges between the 2 types; they have nearly all the attachability of the low-end 4321/4331 systems and/or the 4341, depending on how the adapters and channels are configured. The high-end 4381 introduced along with the 4361 in September 1983 can run the extended addressing MVS/XA environment operating system bridging the gap between the 4300 line and the 308X processors.

IBM's original stated intent in 1979 when 4300 was introduced was to reserve distributed processing for 8100 systems, and use the 4331 systems for more conventional centralized types of small business processing. Low-cost data communications facilities were provided as an adjunct. The system was targeted at sites with some local data processing support. Remote console control features were not provided and "help" features for nondata-processing personnel were kept to a minimum.

The IBM user base had other ideas. They observed that the 8100's support for local processing was not very powerful, and it had no compatible growth path. They observed the low cost of the communications adapter on the 4331. Further, the supporting ACF/VTAME software was upward compatible with the ACF/VTAM plus ACF/NCP/VS combination that is utilized with 3705 front ends. They also observed that local data processing facilities were entry-level versions of a growth path that extended to the top of the business data processing market. So they bought 4300s as distributed systems and complained that they wanted remote console, program downloading, and help facilities. They also complained that the low-end systems were complex to configure and easily overloaded with too many I/O devices.

In November 1981, IBM reorganized the 4300 product line. The most revolutionary changes were at the low end. The 4321 and 4331-11 "packaged" models were introduced and the 4331-1 was withdrawn. The 4321 and 4331-11 standard system packages incorporated many features and integrated adapters, optional on the older 4331-1, and eliminated loop-attached devices altogether. Although neither is packaged with auxiliary storage devices or workstations (which is usually what the industry means by a packaged system), the result is an immense simplification over the array of bits and pieces that had to be fitted together before. The 4331-1 had 36 processor options, while the 4331-11 has 2 and the 4321 has none.

However, in late 1982 the low end of the product line was again reorganized. Loops, adapters, options, and software that were previously disallowed on the 4321 and 4331-11 were again permitted. Earlier the same year the "unbundled" form of DOS/VSE was added to the 4321 system, allowing these users more latitude in configurations and more complications.

Concurrent with 4321 and 4331-11 introductions, IBM also announced 2 features of considerable importance to potential distributed systems users. The first is a no-charge remote console facility (ROCF) extending the remote support feature (RSF); ROCF, in conjunction with VSE/OCCF software, allows remote 4300 systems to be loaded (IML and IPL) from a central site. The second is a (truly) packaged version of DOS/VSE called SSX/VSE, which incorporates 15 system programs and a variety of installation and operational aids with extensive prompting support for novice users. The resulting 4321 and 4331-11 SSX/VSE installations can be set up by nondata processing personnel and be running in 2 hours.

The announcement of the 4321, 4331, and SSX/VSE products repositioned the low end of the 4300 line for distributed processing. Corollary announcements offer support for new versions of many communications packages and promise more rapid development of the VM/CMS operating system as a low-cost, low-overhead timesharing system for small installations. Most of the enormous body of IBM mainstream DOS/VS/VSE and VM software is compatible with the new models; new prompting-oriented versions of popular packages are also being offered.

In September 1983, IBM announced the long-awaited 4381 "Glendale" Models which filled the gap at the 2.3 and 3.0 MIPS level between the 4300 line and the 308X processors. These new processors fulfilled most of the industry anticipations of what was needed at this level: expansion of I/O to complement processor power, compatibility with both low end 4300 and high end 308X series software, air cooling as opposed to water cooling, and improved scientific processing capability.

IBM's best kept secret was not the anticipated 4381 models, but the 4361 announced at the same time. The 4361 in many respects replaces the 4341 as the primary larger distributed system in the series. The 4361 answers all the complaints 4331 users had when they tried to move up to a system with more power. The 4361 retains 4331 attachment versatility, but provides a modern, efficient bus-centered architectural implementation, with high-speed I/O channels capable of attaching larger system DASDs, and yet the economical communications line adapter associated with highly portable VTAME software.

The CPU power, and I/O power (if optional channels are implemented in place of DASD adapters) are just under the high-end 4341-12. Furthermore, new scientific instructions, hardware floating-point unit and other functional enhancements make the 4361 highly competitive with superminicomputers. IBM pricing of the 4361 also competes with superminicomputer pricing. IBM has dropped prices again, lowering the "price umbrella" under which other vendors price their products.

At the same time, the 4361 Model Group 3 was announced on September 10, 1984, the 4321 and 4331-11 went into limited new production. The 4361 Model 3 provides the same performance as the 4331-2 for commercial applications. For scientific applications, its performance is equivalent to 1.4 to 2.2 times that of the 4331-2. Like the 4321, the 4361-3 includes many standard features that are options on the 4331. It also provides a floating point processor option which is standard on the 4361-4/-5, but it also includes some of the standard features of the 4361-4/-5. Overall, the 4361-3 bridge features make it a good replacement for the 4321 and 4331-11 systems.

Communications Systems includes only distributed processing systems and not host mainframe systems. Therefore, this report contains only the 4300 systems hardware and software most appropriate for the distributed processing environment. In this environment, program development is usually done at a host site and downline loaded to the distributed site. Initially, IBM developed the DOX/VSE operating system for the 4300 distributed systems. Later, IBM bundled DOS/SCP/VSE with a number of program product packages into SSX/VSE, which is

 ©1984 Data Decisions

IBM 4300 Series Distributed (SSX/VSE) Computer Systems
Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

less expensive than the separate DOS/VSE packages and easier to install.

Thus, the only software described in this report is the software that runs under SSX/VSE. The 4300 Series can now support the 3705 communications processor (but not yet the 3725) operating as a front end to handle the communication environment under SSX/VSE 1.3 and 1.4. The 4300 models described in this report support an integrated communications adapter that can connect up to 8 lines to the system. The SSX/VSE operating system includes the ACF/VTAME or ACF/VTAM 2.1.0 software to support the integrated adapters without NCP software. The ACF/VTAM 2.1.0 included in SSX/VSE 1.3.0 can also operate with NCP in the 3705. The SSX/VSE package also supports the sharing of teleprocessing resources among programs in single or multiple hosts (multisystem networking).

☐ Strengths

The 4300 series has an excellent price/performance ratio in comparison with earlier products. This ratio continues to improve, primarily due to state-of-the-art technology. The new 4361-3 provides more facilities and performance at a lower price than the 4321.

The 4300 was the first business system in the world to use 64K-bit memory chips, and the resulting low price of $15,000 per megabyte knocked the bottom out of the PCM memory market. Memory prices now are half that price; $7,500 per megabyte.

The 4300 technology has resulted in greater system reliability, lower power requirements, less heat emitted, and no requirements for special air conditioning on the low-end model. Users report no compatibility problems when transferring programs from System/370 to comparably configured 4300s operating in S/370 mode. This means that 4300 users draw from the largest software base in the world.

The SSX/VSE package is a real bargain. The $1,230 monthly license fee is exceeded by the combined license fee of only 3 of the 15 integrated packages when they are priced separately. In addition, a $20,000 purchase price for the basic package represents an outstanding bargain over the rate for perpetual licensing. The purchase arrangement is justified in less than 2 years. As distributed systems, the 4321, 4331, and 4361 are more economical for communication than the 4341 and 4381. The low-end models integrated adapter running under SSX and VTAME or VTAM 2.1.0 costs much less than a separate 3705 or 3725 front end associated with ACF/VTAM in the host and NCP in the front end. In spite of the hardware differences, the 2 are compatible.

The distributed processing remote console and prompting features are helpful for users who want to configure downloaded remote sites and run without technical personnel. The most important characteristic, however, made users buy the 4300 systems before these distributed features were available: the upward growth path for local processing is virtually unlimited and the central site is completely compatible.

The 4361 is a powerful contender in both the distributed processing and scientific supermini marketplace. It combines the 4331 I/O attachability with a highly compact and efficient processor that is nearly 2.5 times more powerful than high-end 4331 CPUs. In addition, the new scientific instructions, and the hardware floating-point unit will probably push scientific processing performance ratios above the 4341 level. The higher comparative ratios for interactive VM/CMS system performance over commercial and batch ratios, suggest that the 4361 architectural implementation will be better for interactive processing than earlier 4300 models.

The addition of MVS to the 4300 upper-end models is supported by extension memory capacity of 16M bytes. This brings the upper end of the "intermediate" 4300, 4341, 4361, and 4381 models in function as well as in power. At the same time, the remote console facility makes the 4361 models more attractive as distributed processing systems. Thus the 4300 systems can operate as a host or as a distributed node in an SNA network, allowing users to set up distributed systems with completely compatible sites, with no limitations as to upward growth path at any of the sites. This also means that central-site programmers do not have to work with a different, incompatible architecture at the distributed sites.

☐ Limitations

The 4321 and 4331 processors are direct heirs to the CPU-controlled IBM system architecture that dates back to batch processing S/360 systems. Although this architecture is implemented in state-of-the-art technology, it still presents performance problems in highly interactive environments, or environments with heavy I/O activity. All integrated I/O adapters steal cycles from the CPU, so I/O activity exerts an immediate effect on processing throughput.

The DASD adapter is oriented toward the fixed-block sectored 3310 and 3370 disks. This means that when the popular and relatively common 3340 and 3344 count-key-data unsectored disks are attached, there is an extra burden on the CPU for the additional emulation logic. This was such a burden on 4331-1 that the use of 3340/3344 disks seriously impacted overall system performance. IBM's model 4321 (which has the same power as the 4331-1) has resolved this problem by limiting disks to the 3310; the more popular 3340 is disallowed. The 4331-11 has added a cache memory to increase processor power, which allows the CPU to support the extra burden of the alien disk architecture, but the 3340 and 3344 disks still impose a disproportionate performance penalty on processor power.

The 4331-2 architecture is a somewhat more powerful version of the architecture of the lower-end 4331-11 and 4321, but still has some of the same problems with balancing CPU and I/O loads. The 4361, on the other hand, is a true bus-centered architecture with far fewer problems of this nature. However, the remarks about the DASD adapter still apply to the 4361-3 but not to the 4361-4 and -5. The 4361-4 and -5 can emulate the CKD format too, but the 4361-3 is limited to fixed-block sectored disks.

The 4321 and 4331 have problems in peripheral portability when moving up to 4341 systems. The 4341 does not support the 3310 disk and the 8809 tape drives. The 4321 and 4331 do support the 3370-A01/B01 module, but they request the expansion 3880 controller.

The 4341, the next logical step in power, does support SSX/VSE but not in communications environments, because SSX/VSE requires VTAME, which in turn requires an integrated adapter—which is not supported on the 4341. SSX/VSE, furthermore supports only sectored disks, so a 4331 user with 3310 and 3370 disks who want to move up to the 4341 must change from the inexpensive DASD adapter to the large expensive 3880 controller and all 3370 disks. These problems are avoided by upgrading to the 4361, but this ugprade requires a significant jump in power. Such a user also eventually reaches the end of an upgrade path even after changing to DOS/VSE because the 4381 and the large 3080 series systems do not support the sectored disks at all.

Users can move to MVS on 4341, 4361, or 4331 systems, but there are no multiprocessing facilities on any 4300 system.

■ COMMUNICATIONS FACILITIES OVERVIEW

The IBM 4321, 4331-2/-11, and 4361-3/-4/-5 can function as standalone processors or as host or cluster controller (distributed) nodes on an SNA network. As a host node, the system can control facilities and execute applications for locally or SNA network connected terminals or batch entry devices. As a cluster controller or distributed processor on an SNA network, the system can do data processing for locally or remotely connected terminals or batch entry devices and communicate with a host node as a terminal. Applications programs can be developed at the host site and downline loaded to the remote site.

The primary software product that supports communication and networking was the Advanced Communications Function and Virtual Telecommunications Access Method Entry (ACF/VTAME) prior to SSX/VSE 1.3.0. The ACF/VTAME program includes the facilities of ACF/VTAM and the Multisystem Network Facility (MNF) running on the large S/370-compatible hosts and ACF/NCP/VS running on an IBM 3705/3725 communications processor. ACF/VTAM owns the network facilities in a host system's domain and maintains control over

 ©1984 Data Decisions

IBM 4300 Series Distributed (SSX/VSE) Computer Systems
Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

them. In addition, ACF/VTAM provides the interface between network facilities and operating system services running on a host. ACF/NCP/VS controls the physical network according to parameters supplied by ACF/VTAM. MNF provides the interface between the local network domain and other network domains. With SSX/VSE 1.3.0, VTAME is replaced by ACF/VTAM 2.1.0 which supports both the integrated communications adapter and 3705 front end.

☐ Distributed Communications

The 4321, 4331-2/-11, and 4361-3/4/5 can function as remote distributed processors for a larger S/370-compatible host. The program development can all be done at the host site and downline loaded to the remote 4300 system. A minimal technical staff is required at the remote site.

☐ Distributed Configurations

The 4321 is a preconfigured system so the main components that can be added are memory, disk, storage, and printers. Within its overall limitation, the system configuration depends on the application.

The 4331-11 is a more flexible system with many configuration possibilities. Again, the specific configuration will be application dependent.

Both the 4321 and 4331-11 provide subsets of the facilities available on all S/370-compatible hosts. Within the subset limits, applications programs that run on other S/370-compatible hosts can be recompiled and run on the smaller systems.

The 4331-2 and 4361-4/-5 are not preconfigured systems but all can run the SSX/VSE packaged software. All support the integrated communication adapter so they do not require a 3705/3725 front-end communication processor to operate in an SNA environment. All can support both the integrated communications adapter and a 3705 front end under SSX/VSE 1.3.0.

The 4361-3 is largely a preconfigured system like the 4321. It includes 8 of the optional features on the 4331 as standard features. In addition, it includes most of the same standard features as those included with the 4361-4/-5. A notable exception is the Floating-Point Multiply Accelerator, which is optional on the 4361-3 and standard on 4361-4/-5. Like the other systems, the 4361-3 includes an integrated communications adapter so it does not require a front-end processor to attach communication lines.

■ SOFTWARE

☐ Terms & Support

Terms • terms vary depending on whether the package is designated as a System Control Program (SCP), Program Product (PP), or Program Offering (PO); POs were previously subclassified as Field Developed Programs (FDPs), Installed User Programs (IUPs), or Programming Requests for Price Quotation (PRPQs) • SCPs are portions of the operating system bundled in the system and incur no license fee • most PPs incur a perpetual monthly license fee for each copy; PPs can also have a lower Distributed System License Option (DSLO) for multiple copies; a few of the more recent PPs also incur an initial license charge followed by the perpetual monthly license fee • most POs are provided under a monthly license with a definite time limit (usually 12 or 24 months) after which no additional charges are levied; IBM occasionally supplies "standard" pricing on PRPQs, but most frequently makes individual quotes on inquiry only; a small number of programs in all categories can be purchased for a one-time charge; a small number of recently announced programs require an initial license fee in addition to the monthly license fee.

Support • support/maintenance policies have been in transition for a number of years, and a variety of pricing/support arrangements are in effect, particularly for PP software • the support category A (central and local field engineering service), B (central service), or C (support withdrawn) for older PPs described the type of service bundled in the license fee at no extra charge; the only other alternative was local service at an additional charge • since 1979, access to a central database containing information on a large percentage of IBM's installed base is included for the currently supported PP releases at no extra charge, but local program support incurred a monthly charge (MLPSC); in 1980, an additional lower fee (MALPSC) was charged for identical programs at the same site or at those distributed sites which could transmit programs to a central site for local service; in 1981, the price structure was revised to combine the 2 fees into a monthly multiple licensed program support charge (MMLPSC) effective on new orders, but the MALPSC was retained until December 1982 for existing customers; MALPSC prices are not included in the text • POs (FDPs and IUPs) are provided on an as-is basis without warranty, but certain programs designated extended support (ES) are provided with central service, usually at no extra charge; POs (FDPs and IUPs) are developed by IBM in conjunction with a particular installation; FDPs belong to IBM, whereas IUPs belong to the coauthor/user, but are licensed through IBM • SCPs are divided into Classes, designated 1 and 2; charges for Class 2 SCP software, including installation planning and installation are wholly integrated into cost of system; Class 1 SCP software is subject to an additional support charge per processor: monthly program support charge (MPSC) and corresponding MAPSC and MMPSC charges for additional and multiple systems like MLPSC, MALPSC, and MMLPSC charges • the user is responsible for installing the Class 1 SCP software (though IBM will assist with planning) • some Class 1 and Class 2 software is available under DSLO; current Class 1 SCP software is also subdivided into categories A, B, and C; category A charge is for DOS/VSE, OS/VS1 1.7.0, or VM/370 1.6.0; category B charge is for category A programs plus MVS 1.3.8 or MVS corequisite SCP for support of MVS/SP; category C includes NCP corequisite SCPs and the EP program for the IBM 3704/3705/3725 front ends (see Products IBM 3705-80, 3705-II, 3725) • operating system support charges for OS/VS1, DOS/VS, DOS/VSE, and/or VM/370 processors are based on Class 1 category A classification for all systems • category B includes MVS with or without being combined with category A.

☐ Software Overview

The 4300 processors in the aggregate support virtually all of IBM's operating systems in the OS, DOS, and VM lines. Specific models, however, are limited to various operating environments.

The 4321 can run in 2 operating modes including ECPS:VSE mode which supports DOS/VSE and SSX/VSE and System/370 mode which supports VM/370. The Extended Control Program Support (ECPS) provides microcode assist to the operating environments including ECPS:VSE for VSE environment and ECPS:VM/370 which enhances performance for VM/370 operation.

The 4331-2 and -11 also operate in 2 standard operating modes: System/370 and ECPS:VSE. System/370 supports DOS/VSE and VM/370 and ECPS:VSE supports DOS/VSE and SSX/VSE on either system. In addition, System/370 on 4331-2 supports DOS/VS 1.34.0, DOS 1.26.0, and OS/VS1.

The 4361 supports VM/370 (VM/SP), VSE (DOS/VSE and SSX/VSE), OS/VS1, and MVS/370 limited to MVS/SP and JES2 or JES3 for Group 5 models.

The 4381 processor (not covered here) is the only 4300 model to support the MVS/XA operating environment.

Because the SSX/VSE is the primary operating system for the distributed processing environment, only that system is described in this report.

☐ Packaged Software

SSX/VSE

Initially available only as integrated software system. Now also available with base and components through PRPQs. Designed as a pregenerated, preconfigured VSE operating system for the IBM 4321, 4331, 4341, and 4361 systems. It was also designed for ease-of-installation, operation, and use. As of October 2, 1984, only the SSX/VSE 1.4 version became available. The other Versions 1.1, 1.2, and 1.3 were withdrawn from marketing.

 ©**1984 Data Decisions**

IBM 4300 Series Distributed (SSX/VSE) Computer Systems
Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

5666 SSX/VSE 1.4 • includes same pregenerated software components as 1.3 with new versions of some programs; also supports new hardware, intelligent workstations, and additional licensed programs • pregenerated components in base product includes VSE/AF Assembler 1.3.5, VSE/OLTEP 1.1.0, EREP 2.3.0, VSE/POWER 2.1.0, CICS/DOS/VS 1.6.0, VSE/ICCF 1.3.5, VSE/IPF 1.4.5, ACF/VTAM 2.1.0, VSE/VSAM 1.3.0 with Space Management and Backup/Restore, DOS/VS Sort/Merge 2.5.0, DITTO for VSE and VM 1.1.0, VSE/Fast Copy 1.2.0, VSE/OCCF 1.1.0, IPCS 1.3.0, and DOS/VS COBOL 1.3.0 • new hardware support includes new IBM 4361 Model 3 processor, IBM 3370 Models A02 and B02 DASD, Intelligent Work Stations (IWS), and Work Station Adapter on IBM 4361 • intelligent workstation is IBM 3270-PC or IBM PC with 3278/79 Emulation Adapter • hardware support includes Communications Adapters, Tape Unit, DASD, and Display/Printer and Integrated Diskette Unit on 4321/4331/4361; Loop Adapter on 4321/4331; and Byte or Block Multiplexer Channel on 4321/4331/4341/4361; MCR/OCR Devices, 3274 Control Units, 3410/11 or 3430 Magnetic Tape Units, 3540 Diskette Units, 3203-5/3262-5/3211/4245 Line Printers, and 3705-11 and 3705-80 communications controllers can attach to the Byte or Block Multiplexer channel; the 337-A01/B01/A02/B02 DASDs connect through 3880 to Block Multiplexer Channel on 4341 and through DASD Adapters on 4321/4331/4361 • IBM 3274/76 Control Units, IBM 5150/5160 PCs in 327X or 377X mode; 377X, 6670, IBM PC in 327X or 377X mode as RJE workstations; and 3601/3602/4701 Finance Controllers (SDLC only) can attach to SDLC/BSC Communications Lines on the Communications Adapter; IBM 3278-2A/3279-2C console, IBM 3268/3287/5210 Terminal Printers, IBM 3289-4/3262-1/-11 Line Printer; and IBM 3178/79/80/3278-2/3279-2A Display Stations, 6580 (in 3278 compatibility mode), Displaywriter or 3270-PC can connect to the Display Printer Adapter on 4321/4331/4361; the Work Station Adapter on 4361 supports the same terminals as the 3274 Local Control Unit • SSX/VSE runs on 4321/4331/4341/4361 in ECPS:VSE Mode, supports 12/16M bytes of virtual storage on 4321/4331/4361 and 16M bytes on 4341, and designed to run in 1M to 16M bytes of real storage; usually, it requires 2M bytes of real memory; 1M bytes required only for systems with maximum of 8 terminals • in general, most applications and files working under SSX/VSE 1.3 will run under SSX/VSE 1.4 • upward compatible with VSE/SP 2.1 except VSE/SP 2.1 does not include VSE/OCCF, DOS/VS COBOL, and DOS/VS Sort/merge; if needed, these must be ordered separately:

NC/NC initl	$1,230/$1,105 mo	$112/$179 serv
$20,000/$18,000 OTC		$112/$179 serv

Upgrade to VSE/SP 2.1:

NC/NC	NA/NA	NA/NA
36,730/33,057		NA/NA

5799-BNF Base SSX/VSE Component • Partial Function PRPQ 7B1030; includes SSX/VSE Advanced Function, SSX/VSE ACF/VTAM, SSX/VSE SCP, SSX/VSE EREP SCP, and SSX/VSE OLTEP SCP:

NA/NA	325/292	112/179
5,285/4,750		112/179

VSE/Power V2 • PRPQ 7B1031:

NA/NA	100/90	NC/NC
1,625/1,463		NC/NC

VSE/VSAM • PRPQ 7B1032; includes VSAM Space Management and Backup Restore Features:

NA/NA	85/76	NC/NC
1,380/1,242		NC/NC

VSE/Fast Copy • PRPQ 7B1033:

NA/NA	5/5	NC/NC
80/72		NC/NC

DOS/VSE COBOL • PRPQ 7B1034:

NA/NA	102/91	NC/NC
1,545/1,390		NC/NC

VSE/IPCS • PRPQ 7B1036:

NA/NA	15/14	NC/NC
244/220		NC/NC

DOS/VS Sort Merge • PRPQ 7B1037:

NA/NA	55/50	NC/NC
894/805		NC/NC

VSE/ICCF • PRPQ 7B1038:

NA/NA	70/63	NC/NC
1,140/1,026		NC/NC

VSE/DITTO for VSE & VM • PRPQ 7B1039:

NA/NA	25/22	NC/NC
407/366		NC/NC

VSE/OCCF • PRPQ 7B1040:

NA/NA	90/81	NC/NC
1,465/1,318		NC/NC

CICS/DOS/VS • PRPQ 7B1041:

NA/NA	360/324	NC/NC
6,000/5,400		NC/NC

IPF • PRPQ 7B1042:

NA/NA	5/5	NC/NC
80/72		NC/NC

VSE Advanced Functions • consists of 1.1.0, 1.2.0, 1.3.0, 1.3.5 packages; 1.2.0 and 1.3.0 are supersets of 1.1.0; 1.3.5 provides additional hardware support and enhancements but support is removed for some system utilities; releases are priced identically; general thrust is toward improved ease of use, availability, and reliability.

Release 1 (1.1.0) • supports 7 partitions for all DASD types; supports 3310 and 3370 fixed block DASDs in 370 mode with Virtual Memory Language Enhancements (VMLE) under VM/370 • reduces number of JCL statements through implicit link capability; supports job-to-job communications through a dedicated 256-byte message pool; permits variable-length file areas; simplifies IPL through an automatic system initialization feature that eliminates need for operator intervention • permits fast fetch of high-use D- and C-transients; supports and maintains a second-level index of the System Directory List in real storage to accelerate load module search time; permits page data sets to span several extents/volumes • requires a 4300 Series computer with DOS/VSE installed and a minimum memory of 160K bytes; DOS/VSE with VMLE support runs only in 370 mode under VM/370 (1.4.0 or later).

Release 2 (1.2.0) • supports up to 208 tasks distributed as a maximum of 32 tasks within each of up to 12 partitions; supports the 3262 Line Printer • supports extended VOLUME command features and DASD sharing among processors; supports the creation and use of multiple procedures, shared access partitions, and concatenated libraries • requirements are identical to 1.1.0; 1.2.0 must be installed if VSE/POWER 1.2.0, VSE/VSAM 1.2.0, or the Fast Copy Data Set is installed.

Release 3 (1.3.0) • supports cross-partition communication, allowing 1 subsystem to communicate with another or with an application program • supports VSE/OCCF, VSE/IPCS 1.3.0, VM/VCNA under VM/SP • improves performance through fast CCW translation of I/O requests; improves usability through simplified supervisor generation and standardizing support of ACF/VTAM and VTAME; improved availability by reduction of the number of cancel conditions, better handling of missing device interrupts • requires DOS/VSE with at least 256K-byte memory • included in SSX/VSE.

Release 3.5 (1.3.5) • provides support for IBM 3430 Tape Unit and IBM 3262-5 and 4245 line printers; incorporates hardware

INITL first figure is initial charge for primary system; second figure is for distributed system (DSLO). MO: first figure is monthly license charge for primary system; second figure is for distributed system (DSLO). SERV: first figure is monthly service charge for a single system (MLPSC); second figure is for multiple systems (MMLPSC), when applicable, a second line includes OTC: one-time charge (purchase) and SERV (same as above). OTC: one-time charge. NA: not applicable. NC: no charge. Prices effective as of October 1984 unless otherwise noted.

 ©1984 Data Decisions

IBM 4300 Series Distributed (SSX/VSE) Computer Systems
Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

support for previously announced IBM 3033; and improves ease of use, availability, and reliability • IBM 3430 tape unit supported as 3410-compatible tape unit; allows 6450-bpi read/write density; IBM 3262-5 and 4245 are new channel-attached printers supported as PRT1 line printers; FBA disk support now available in System/370 mode as well as ECPS:VSE mode; up to 16M bytes of virtual storage can be specified regardless of real memory size for System/370 mode as well as ECPS:VSE mode; SIOF (start I/O fast) support to improve performance for heavy I/O applications • now incorporates IBM 3033 support in System/370-mode for operation in single-processor mode; IBM 4321 support for both ECPS:VSE and System/370 modes; IBM 3375 as CKD disk storage device; IBM 3270 Model 2C as color display console; and IBM 4341 Group 9-12 in ECPS:VSE and System/370 modes • various ease of use features added such as reduction supervisor generation parameters, ISPF support in ICCF interactive dialogues, upper-/lowercase options for controlling output SYSLST, easier activation of access control during system start-up, system file definition by volume identifier during system start-up and turn-off of fast CCW transaction for all partitions • ALTBLK, INTDK, and SURFANAL system utilities removed, now available in Device Support Facility, a corequisite SCP; OLTEP and EREP removed, now available as separate SCPs; all 3 are shipped with VSE/AF 1.3.5 • available January 31, 1984; requires same hardware as 1.3.0 • included in SSX/VSE 1.1.4.

VSE/OLTEP Version 1.1.0 SCP (Class 2) • On-Line Test Executive enables customer engineer to perform online diagnosis and maintenance on a VSE/AF 1.3.5 system; enhancement in this version eliminates need for a CKD disk for creation of configuration Data Set (CDS); requires operator console, tape drive, and printer • available January 31, 1984; included in SSX/VSE 1.4.

EREP Version 2.3.0 SCP (Class 2) • Environmental Recording, Editing, and Printing is a program common to OS/VS, DOS/VSE, and VM/370 system environments, processes error records created by VSE/AF 1.3.5 for rapid identification of component failures in DOS/VSE system • available January 31, 1984; included in SSX/VSE 1.4.

Device Support Facility 1.6.0 SCP • corequisite SCP with VSE/AF 1.3.5; includes Assign Alternate Block (ALTBLK), Initialize Disk FBA (INTDK), and Surface Analysis for FBA (SURFANAL) system utilities • available January 31, 1984.

VSE/POWER Version 2 (2.1.0) • combines Version 1 functions with RJE and networking capabilities; allows VSE systems to be full nodes on SNA or BSC networks with other VSE, SSX/VSE (SNA), VM/RSCS (BSC), or MVS/SP JES2 systems; communication with MVS/SP JES3 is planned • multileaving capability of 1.2.0 RJE feature not supported because function included in V.2; these 2 types of systems also do not communicate; the shared spooling feature will also not operate under V.2, but must be replaced with V.2 version • requires DOS/VSE/AF 1.3.0 and ACF/VTAME for SNA mode • included with SSX/VSE 1.4.

Shared Spooling Feature • allows different VSE/POWER systems to access common queues and account file.

VSE/VSAM (1.3.0) • consists of 1.1.0 and 1.2.0 packages; 1.2.0 is a superset of 1.1.0 general thrust is toward increasingly versatile handling of FBA disk devices and SAM file mapping into VSAM spaces; both releases are priced identically.

1.1.0 • supports fixed block addressing (FBA) mode on 3310, 3370, and 3380 DASDs; supports streaming feature of the 8809 Tape Unit but does not exploit it; calculates device-dependent optimum block sizes automatically; translation facility converts programs written in higher-level languages with embedded references to ISAM data sets into comparable programs with VSAM references; fast catalog access and other catalog maintenance features significantly improve disk space utilization (compared with DOS/VS VSAM) and file/volume portability • requires DOS/VSE with VSE/Advanced Functions 1.1.0; alternatively operates with CMS/DOS BSEP 1.2.0 in support of VM/IFS and DL/1 DOS/VS.

1.2.0 • upward compatible with 1.1.0; significant enhancements allow DASD volumes to be shared among partitions and external systems and VSE/VSAM space management for SAM files (optional feature); VSE/VSAM is generally compatible with OS/VSAM, but VSE/VSAM-managed SAM files are not transportable to OS; a tape backup/restore feature functions with the streaming facilities of the 8809 and permits backed up data to be redistributed into different locations within DASD volumes • requirements similar to 1.1.0 but operates with VSE/Advanced Functions 1.2.0 or 1.3.0 • included in SSX/VSE 1.4.

1.3.0 • upward compatible with 1.2.0 • included in SSX/VSE 1.4.

Space Management For SAM • allows user to turn space management over to system • included with VSE/VSAM.

Backup/Restore Feature • provides backup to tape and restore from tape • included with VSE/VSAM.

SSX/VSE Support Facilities

VSE/ICCF Basic Function • an important ancillary DOS/VSE program that provides an extensive interactive facility to DOS/VSE for program development and discrete application tasks; it is compatible with all of the DOS/VSE control programs, high-level languages, telecommunications packages, and database facilities • generally oriented around the 3270 Terminal System; provides online library, source program data entry, and update/maintenance facilities; includes online library maintenance facility for compression, purging, insertions, and many other functions; contains a full screen editor; features compile load-and-go capability in interactive mode; permits existing DOS/VSE programs to be run interactively; shares terminals with CICS; supports all FBA, streaming, and other devices that run under DOS/VSE • **1.1.0** requires DOS/VSE with VSE Advanced Functions 1.1.0; terminal support is provided either by an integrated Terminal Transmission Facility (TTF) or by CICS/DOS/VS; TTF requires BTAM-ES (5746-RC5); CICS/DOS/VS requires BTAM-ES, or ACF/VTAME; system console is supported as a terminal under CICS but not under TTF; vendor-reported operational performance support figures for a 4331 with a 512K-byte main memory with 36K user-available bytes, and operating under CICS/DOS/VS yielded a range of 0.74-second to 1.74-second average response times for low-end parameters of 10 terminals on 1 line at 30 messages per minute and high-end parameters of 30 terminals on 2 lines at 90 messages per minute; corresponding CPU utilization figures were 20% to 65%; 5 locally attached terminals operating under the integral TTF facility in the same configuration yielded an average response time of 0.75 seconds for 15 messages per minute; CPU utilization was 12% • **1.2.0** provides all functions of 1.1.0 and enhancements: cursor extended VSE/POWER interfaces to display VSE/POWER queues at the user terminal, can password protect VSE/POWER jobs, can access VSE/POWER list and punch queues, and can selectively display VSE/POWER print files; supports VSE/VSAM share option 4 for programs running in interactive partitions and concatenated relocatable libraries • requires VSE/ACF 1.2.0 • **1.3.0** provides new functions which include support for cross-partition communication facility in interactive partitions, CICS/VS multiregion operation, 3278 Model 5 (wide screen) under CICS/VS 1.1.5, improved print output from interactive partitions, notification facility, and extension of full-screen display • designed to operate with VSE/AF 1.3.0 • **1.3.5** improves usability, provides better information on network activities, and helps reduce restart times • supports multilevel program function keys; provides new edit macro order; removes requirement for prefix in macro name; complements NOTIFY function in VSE/POWER so that a communication link is established between ICCF and VSE/POWER to notify terminal user about job events automatically; adds new parameter INCL to allow printing or punching of included members; skips recovery if library is correct; and eliminates need to reassemble modules to tailor ICCF • supports IBM 3290 as 3278 Model 2-5 compatible device • requires functions of CICS/VS 1.6.0, VSE/POWER 2.1.0, either BTAM-ES 1.1.0 or ACF/VTAM 2.1.0, and VSE/AF 1.3.5 • included in SSX/VSE 1.4.

Interactive Productivity Facility (IPF) 1.4.5 • provides simplified interactive user interface to operating system; uses facilities of ICCF • included in SSX/VSE 1.4.

VSE Interactive Problem Control System (VSE/IPCS) 1.3.0 • diagnostic program intended for DOS/VSE-based systems

 ©1984 Data Decisions

IBM 4300 Series Distributed (SSX/VSE) Computer Systems
Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

operating in an interactive environment; builds disk file of problem data and provides dump and problem formatting facilities for software fault analyses; operates in 370 or ECPS:VSE mode; contains migrate (to tape) utility for disk space conservation and support for off-line analysis • requires DOS/VSE with VSE/Advanced Functions; operates with VSE/ICCF (5746-TS1) but does not require it; basic program requires 400 blocks of core image library space and 200K bytes of virtual storage; migrate utility requires additional 140 blocks and 116K bytes • included in SSX/VSE 1.4.

Data Interfile, Transfer, Testing & Operations Utility (DITTO) for VSE & VM • extends the capability of DOS/VSE to list, copy, alter, and create files or portions of files for card, tape, and disk devices; file-to-file facilities support SAM, ISAM, and VSAM files and permit block factors and file locations to be changed; device-to-console functions include a window scan facility for tape or disk files; both variable-length (CKD) and fixed-block (FBA) DASDs are supported • requires DOS/VSE and VSE/Advanced Functions • 1.1.0 supports 3540-compatible diskettes; adds tape map, copy, buffer, display, and process functions; extends tape and disk scanning, disk to console and disk dumps, and disk record load functions; allows VSAM files to be created from card input; extends SET function to run in batch mode and allow user to specify parameters; offers significant ease-of-use improvements • designed to operate under VSE/AF 1.3.5 and with VSE/VSAM if its functions used; requires space management features on VSAM • included in SSX/VSE 1.4.

VSE/Fast Copy 1.2.0 • augments copy facilities integrated into DOS/VSE for improved productivity; provides full-track read for CKD devices; provides partial volume dump/copy control; permits single files to be copied into multiple volumes; permits all copied/restored files to be relocated; generally access-method independent, but relocation facility supports SAM files only • requires DOS/VSE with VSE/Advanced Functions 1.2.0 • 1.2.0 is an enhanced version of 1.1.0 using multibuffering to allow streaming with 8809 tape unit using DUMP and RESTORE functions; from 2 to 24 buffers of 16K bytes each can be used depending on the space available in the partition • tapes are compatible in both directions between this release and Version 1.1 • available January 31, 1984; included in SSX/VSE 1.4.

VSE/OCCF VSE/Operator Communications Control Facility 1.1.0 • a productivity aid designed to reduce the system console operator's chores and to permit the system to be operated from a remote NCCF terminal; runs only under DOS/VSE SCP and is particularly suited for a DDP environment; message traffic is reduced through an exception reporting scheme that suppresses all information-type messages; contains a message translation facility that can alter messages to fit the operator skill level; message length is truncated beyond 247 characters; maximum reply/command length is 80 characters • requires DOS/VSE SCP with VSE/Advanced Functions; may also require NCCF and ACF/VTAME • included in SSX/VSE 1.4.

5735-XXA ACF/System Support Programs (ACF/SSP) 2.1.0 • for generation of ACF/NCP for the 3705 communications controller:

$508/$381 initl	**$92/$69 mo**	**$24/$38 serv**
NA/NA OTC		**NA/NA serv**

☐ Data Management

IBM's IMS/VS database for the OS/VS group of operating systems is also the root system for the DOS/VS/VSE environment database, called DL/1. (DL/1 bears the same name as the data definition language that is common to both databases.)

IMS/VS and DL/1 share common access methods and file interfaces. In addition to the standard DL/1 system, DL/1 is also sold in a specialized version an entry-level DL/1 subset. A prompter-supported version for SSX/VSE systems has been replaced by the DL/1 subset that now supports SSX/VSE 1.4. The SQL relational interface is unique to DL/1 systems and cannot be interfaced to IMS.

DL/1 Database Kernel • allows user to describe database structures, create databases, access and maintain databases, reorganize databases, perform recovery and reconstruction of data, and invoke checkpoint/restart operations • includes variety of utility programs designed to manage the user-database interface • utilities are called through the DL/1 database language facility.

Access Methods • HSAM (Hierarchic Sequential Access Method) is implemented as a single sequential access method (SAM) data set with fixed-length unblocked records, where each data set record stores an integral number of segments and any residual space in the record remains unused • HISAM (Hierarchic Indexed Sequential Access Method) can be implemented through ISAM or VSAM, with space allocation being managed through the Overflow Sequential Access Method (OSAM) for ISAM files, and VSAM being implemented through the Entry Sequenced Data Set (ESDS) technique and managed through the Keyed Sequence Data Set (KSDS) technique • Hierarchic Indexed Direct Access Method (HIDAM) consists of multiple OSAM or ESDS data sets but differs from HISAM in that data sets can be distributed arbitrarily throughout memory, and accessing is supported by a primary index database • HDAM (Hierarchic Direct Access Method) is similar to HIDAM but lacks the index • Generalized Sequential Access Method (GSAM) is intended to support SAM/VSAM-based data exchanges among different programs; supports root-only databases with fixed-length root segments.

File Interfaces • database consists of records, segments, and fields; a record contains fixed- or variable-length segments of related data; up to 255 segment types and up to 15 segment levels are supported, with each segment consisting of an unlimited number of fields, which are fixed-length byte strings; hexadecimal and character fields can be up to 255 bytes long, while packed decimal fields are limited to 16 bytes; organizational relationships in the record/segment/fields sequence are strictly hierarchical, with each sequence defined as a single-rooted tree of distinct segment types; a root segment defines the general record class, with keyed linkage (pointers) to establish segment relationships; each segment has a concatenated key to provide vertical mobility from any point in the tree; the lowest element of data resolution is a field in all access methods except GSAM, and in all databases except data entry databases (DEDBs) and main storage databases (MSDBs).

Database Services • support is provided via Data Language/1 (DL/1), which is common to both IMS/VS and DL/1 database systems; provides support for ISAM and VSAM and shared resources; secondary indexing of databases is automatically maintained for VSAM databases; the Parallel DL/1 facility permits calls to databases to be processed in each Message Processing Region and/or Batch Message Processing Region (except when reading from ISAM data sets); incorporates Edit/Compression Routine Exits as well as Low-Level Code and Continuity Checking support facilities • provides ISAM/OSAM buffer handling and the Partial Data Base Reorganization utility; Field Level Sensitivity provides a mechanism to limit access to a subset of the fields in an IMS/VS DL/1 data segment (this facility is not available with GSAM databases).

5666-275 DL/1 SSX/VSE • SSX-compatible version of 5746-XX1 DL/1 DOS/VS 1.6; prompter supported for installation but not for ongoing operations • replaced by 5746-XX1:

NA/NA initl	**$429/$322 mo**	**$126/$201 serv**
NA/NA OTC		**$126/$201 serv**

5666-292 Query Management Facility for VSE QMF/VSE 1.1.0 • extends the query and report writing capability of VSE Advanced Functions to end users; user-aid facilities include model queries, sample tables, prompting, and online HELP functions; other features include Query Language selection from either Structured Query Language (SWL) or Query By Example (QBE), command-driven display screens, and relational database manipulation • requires DOS/VSE with Advanced function 1.2.0 with a minimum real storage of 2M bytes (4M bytes is recommended); also requires SWL/DS 1.2.0, CICS/DOS/VS 1.1.5 or later, and 5748-XXH Graphics Data Display Manager (GDDM) 1.2.0 or later • available fourth quarter of 1983; future releases will support German and Spanish; verified under SSX/VSE 1.4:

NA/NA	**600/540**	**81/130**
NA/NA		**NA/NA**

 ©1984 Data Decisions

IBM 4300 Series Distributed (SSX/VSE) Computer Systems
Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

5746-XX1 DL/1 DOS/VS 1.7.0 • available to run under SSX/VSE 1.4 as of October 2, 1984; replaces DL/1 DOS/VS 1.6 and 5666-275 DL/1 SSX/VSE:

NC/NC	**429/322**	**136/218**
NA/NA		**NA/NA**

5748-XXJ SQL/Data System • relational data access system for support of interactive queries, report writing, end-user database facilities, and other applications where data structures and application requirements change; extract facility enables users to copy selected portions of DL/1 data into SQL tables; all SQL data and operations are defined and accessed in terms of tables and operations on tables; SQL (Structured Query Language) is used for data definition, access, manipulation, and control; can operate interactively without prior storage of an application program • requires DOS/VSE Advanced Functions 1.3.0 or later; requires 1M bytes of storage (2M if used with CICS/VS); verified under SSX/VSE 1.4:

NA/NA	**434/324**	**131/209**
NA/NA		**131/209**

Database Aids

5746-XXC DB/DC Data Dictionary • central collection of information about data resources needed for data management; stores, processes, and reports on definitions, descriptions, and relationships of data; data definitions are entered via the dictionary command language or the interactive display form facility; users can obtain predefined reports on contents and relationships; commands can process stored definitions to produce source statements for the generation of database descriptions and program specification blocks (PSBs) suitable for host DL/1 libraries • provides user with sign-on security, user profile security, and a program access facility • 1.4.0 is the most current version:

NC/NC initl	**$459/$343 mo**	**$83/$133 serv**
NA/NA OTC		**NA/NA serv**

5798-CYT ISAM-DL/1 Bridge • FDP; execution time interface between DL/1 and ISAM application program • requires an operating system selected from DOS/VS product lines • currently available; central service not available • license fee is charged for 12 months:

NA/NA	**165/NA**	**NA/NA**
NA/NA		**NA/NA**

5798-DFJ DOS/Data Base Guide • FDP; provides disk space estimates on existing or projected databases; suggests design changes to improve hierarchical performance by evaluating physical database descriptions against direct tuning guidelines • requires DL/1 database, plus an operating system selected from DOS/VS or DOS/VSE product families • currently available • license fee is charged for 12 months:

NC/NC	**35/NA**	**NC/NA**
NA/NA		**NA/NA**

5796-AJE Productivity Aid: DOS/VS DBDUMP Utility For DL/1, DL/1 Entry & VANDL/1 • IUP from Sagner Inc • allows DL/1, DL/1 Entry, and VANDL/1 users to access, display, and edit databases; provides wide ranging accessibility to data • requires an operating system selected from DOS/VS product lines • currently available; central service not available • one-time license fee:

NC/NC	**NA/NA**	**NA/NA**
400/NA		**NC/NC**

File Management & File Access

5798-DFY File Conversion For Word Processors • FDP; converts SAM or VSAM data into a format that can be merged with letters on IBM 6670, OS/6, 6640, Mag Card II/6240, or Displaywriter systems • requires an operating system selected from OS/VS or DOS/VSE product lines • currently available; central service not available • one-time license fee:

NC/NC initl	**NA/NA mo**	**NA/NA serv**
$835/NA OTC		**NC/NA serv**

5798-DBC Data Retrieval/Manipulation Utility • FDP; provides file-to-file functions for card, sequential disk, diskette, tape, printer, ISAM and VSAM file types; fixed- and variable-length records • requires an operating system selected from DOS/VS, DOS/VSE product lines • currently available; central service not available • license fee is charged for 12 months:

NC/NC	**48/NA**	**NA/NA**
NA/NA		**NA/NA**

5798-AWH DOS/VS DASD Device Independence Open (DI-OPEN) • FDP; reduces the time and effort required to convert to a new DASD device in a DOS/VS or DOS/VSE environment • requires an operating system selected from DOS/VS product lines • currently available; central service not available • license fee is charged for 24 months:

NC/NC	**43/NA**	**NA/NA**
150/NA		**NC/NC**

5798-CYR Virtual Storage Access Method (VSAM) Operations Utility • FDP; requires an operating system selected from DOS/VS, DOS/VSE product lines • currently available; central service not available • license fee is charged for 12 months:

NA/NA	**150/NA**	**NA/NA**
NA/NA		**NA/NA**

STAIRS Retrieval System

5798-DEE STAIRS to Advanced Text Management System (ATMS) Document Transfer Extended • FDP; provides STAIRS output file in format usable as input to ATMS; allows updating of STAIRS/VS database without need for duplicate files • requires an operating system selected from DOS/VSE, OS/VS product lines • currently available; central service not available • license fee is charged for 12 months:

NA/NA initl	**$105/NA mo**	**NA/NA serv**
NA/NA OTC		**NA/NA serv**

☐ Communications/Networks

IBM's approach to and support of the communications environment is one of the few IBM activities that cuts across all product lines and in many ways is as significant as the whole body of mainframe support programs. The cohesive force is supplied by System Network Architecture (SNA), which is not a specific identifiable software module such as, for example, MVS 1.3.8, but is a master design for the evolutionary development of a collection of many hardware/software modules to support data interchanges among practically all IBM devices. SNA enforces compatibility at the device, the system, the program, and the network levels. The primary system-level control programs are Advanced Communication Function (ACF) for VTAM (ACF/VTAM), which resides and executes in the host mainframe. The primary network-level module is ACF for the Network Control Program (ACF/NCP), which resides and executes in the 3705 Communications Controller that connects the SNA host(s) into the network. ACF/VTAM incorporates NCP functions for control of integrated line adapters into VTAM, eliminating the need for a 3705 front end. Most other communications-oriented modules are directly or indirectly related to the essential chore of maintaining compatibility among the various communications levels of IBM devices for ease of integration into SNA. CICS/VS is a program product that links programs (both database program products such as DL/1 and user programs) to communications terminals.

The SSX/VSE 1.3.0 operating system is the first version to support a 3705-II or 3705-80 communications processor running in NCP mode and operating as a front end to the 4300 Series. Earlier versions supported the integrated communications adapter with ACF/VTAME running on the 4300 and combining some of the functions of ACF/VTAM on a host and ACF/NCP on the front-end processor. SSX/VSE 1.3.0 includes ACF/VTAM 2.1.0, which supports both the integrated communications adapter and the 3705-11 or -80 communications processor.

Advanced Communications Function

Advanced Communications Function (ACF) software is designed to implement IBM's System Network Architecture (SNA). ACF software for 4300 products falls into 3 main groups: the ACF/TCAM variations which support OS/VS-type operating

 ©1984 Data Decisions

IBM 4300 Series Distributed (SSX/VSE) Computer Systems
Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

systems and their derivatives; the ACF/VTAM variations which support both OS/VS- and DOS/VS-type operating systems and their derivatives; and ACF/NCP/VS which resides in the 3705 front-end and provides the primary network control functions. IBM refers to the combination of ACF/VTAME, or ACF/VTAM 1.2.0 or 1.3.0 with DOS/VSE as "VSE System." ACF/VTAME included in SSX/VSE package with 1.1.0 and 1.1.2 SSX/VSE 1.1.3. and 1.1.4 include ACF/VTAM 2.1.0, which supports both integrated communications adapter as well as 3705 front end.

5746-RC7 VTAM Entry (ACF/VTAME) • intended to support the Communications Adapter feature (in lieu of the 3705) of the 4321 and 4331 operating under DOS/VSE or SSX/VSE; provides facilities similar to ACF/VTAM 1.2.0 and supports most key functions of ACF/NCP/VS; can be used in single system or in multiple systems environments; contains integrated MNF (Multisystem Network Facility); supports cross-domain SDLC linkages to other processors equipped with ACF/TCAM with MNF or ACF/VTAM with MNF; supports Network Communications Control Facility (NCCF); does not support NTO and many 3705-related extended features; supports major SDLC devices but does not support SS devices and BSC devices except for nonswitched BSC 3270 terminals; upward compatible with ACF/VTAM 1.2.0 and 1.3.0:

NC/NC initl	**$179/$161 mo**	**$75/$120 serv**
$4,000/$3,000 OTC		**$71/$113 serv**

ACF/VTAM 1.2.0 for VSE • variation of 5735-RC2, which is functionally similar to ACF/TCAM in that it provides front-end communications control functions for interfacing a system into SNA • supports both integrated communications adapter on 4300 processors as well as 3705-II and -80 communications processors • requires VSE/AF 1.3.5 • included in SSX/VSE 1.4.

5666-285 Network Communications Control Facility (NCCF) for VSE/AF 1.2.0 • essentially a higher-powered version of NOSP; primary function is to support network operations as a set of tasks relatively independent of the device- or system-level interfacing tasks; works through command processors, which are effectively insulated from the various access-method and operating-system differences, to gather error and problem data and to provide a similarly independent level of control for network operations; operates with NPDA for data gathering; supports all TP network operations at program execution speeds • runs under DOS/VSE with VSE Advanced Functions, NCCF is required for each different access method in the network • 1.2.0 supports 3863, 3864, and 3865 modems, the 3867 Link Diagnostic Unit, 3600 Threshold Analysis; also contains remote access feature • does not support 3710 network controller:

1,050/945	**175/158**	**20/32**
NA/NA		**NA/NA**

5666-295 Network Problem Determination Application 3.1.0 • basically a record-gathering facility for monitoring/management programs such as NOSP and NCCF; collects all network error data for on-command display at a user-designated control terminal; depends on certain NCCF facilities for operational transparency to the access method and the operating systems; gathers error data in hierarchical order from the link level to the device level • available for DOS/VSE and SSX/VSE systems only; provides functional enhancements and new product device support • new products include X.25 networks, Series/1, 3274 control unit, S/38, 3725 communications controller, 3650 programmable store system, IBM Displaywriter System, 4700 Finance Communication System, MVS/XA Device Support • NPDA Version 2 Database is upward compatible with NPDA Version 3 Database, Version 3 may be used to view Version 2 data, however, NPDA Version 2 should not be used to view Version 3 data • 3.1 supports SSX/VSE but 3.2 does not:

825/618	**132/99**	**19/30**
NA/NA		**NA/NA**

IBM 3600/4700 Threshold Analysis & Remote Access 3.0 • supports 3600/4700 Finance Communication Systems for problem determination, performance data, alert generation and remote operation:

1,210/907	**176/132**	**19/30**
NA/NA		**NA/NA**

Customer Information Control Systems CICS/VS

CICS/DOS/VS 1.6.0 • functionally similar for OS/VS group and DOS/VS group environments, but DOS/VS group and OS/VS group variants are uniquely adapted for operational interfacing; basically an extensive TP monitor with embedded file handling capabilities; primary function is to provide a controllable interface between terminal-originated applications programs and the host operating system, but is used extensively to provide a functional link among applications programs, the operating system, and DBMS facilities • operates compatibly with and augments IMS/VS DL/1 language; recommended complement for DL/1 DOS/VS database; supports multithread and multiregion (partitions or address spaces) operations; multimodular structure consists of system management, service, monitoring, reliability, and support modules and an applications services module.

System Management • separately addresses the general functions of task, storage, program, time, terminal, and data management with operating system-like facilities; multitasking devices such as priority scheduling, transaction synchronization, and serial resource control are supported to permit concurrent transaction processing; storage management is handled within the main storage subset assigned to CICS by the operating system; multiprogramming is supported along with a real-time program fetch capability; both time interval and time-of-day task initiation/cessation controls are provided to support runaway task control and stall detection; host-terminal bidirectional communications and multiple concurrent access methods are supported; supports VTAM/NCP and BTAM • CICS/OS/VS additionally supports TCAM and GAM and can support the VTAM-based Fast Path feature of IMS/VS under OS/VS2 (MVS) when equipped with the High Performance Option (HPO); CICS/DOS/VS 1.4.0 (not 1.5.0) additionally supports DOS/VS EXTM; VSAM, IDAM, and BDAM data sets in direct or keyed access modes; all general file functions are accommodated including alternate indexes and relative record data sets under VSAM; intersystem communication facilities (SNA only) permits interfile/DL/1 database communications; permits inter-application dialogues, fraction shipping, and screen interpretation for IMS/VS; DL/1 databases can also be stored between DL/1 batch and online CICS programs; additional data management facilities are a transient data facility that provides queueing control for in-transit data, a scratch pad facility for terminal overhead tasks such as message switching and data queueing, a journal management facility, and a synchronous point controller to support backout and rollback procedures and other ad hoc procedures related to the transient data and temporary storage facilities.

System Service • establishes master, supervisory, and operator terminal functions; provides a logging facility for general system statistics; asynchronous transaction processing (ATP) facility supports queueing/dequeueing operations for batch-oriented terminals; supports general-purpose message switching.

System Monitoring • supports separate trace and dump facilities for debugging assistance and permits selective logging.

System Reliability • augments facilities of host operating system to provide terminal transaction-oriented recovery/backout/restart functions; significant features are 2 abnormal condition programs that analyze soft failure terminal problems.

System Support • includes independent SYSGEN, environment definition and initialization facilities; provides orderly shutdown procedures for control return to operating system; includes a high-level programming interface translator and a preprocessor to convert CICS Execute statements into acceptable source language; contains independent trace, dump, formatted dump, and system log/journal utilities.

Applications Services • most significant feature is a mapping facility that independently handles service assignments and message routing; thus permits applications programs to be written interactively at the service language level; provides extensive repertoire of diagnostic, editing, bit manipulation, formatting, and other capabilities to support interactive program development.

 ©1984 Data Decisions

IBM 4300 Series Distributed (SSX/VSE) Computer Systems
Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

Other Characteristics • operates with minor restrictions under VM/370 groups; special versions (now class C program products) of CICS/DOS/VS are CICS/DOS/VS Subset Option and CICS/DOS/VS Entry Level System (ELS), both of which have many limitations relative to CICS/DOS/VS with ELS at the lowest level; ELS supports only the 3270; the Subset Option supports only the 3270, 2740, 2741, and 3767 Terminals • CICS/DOS/VS requires OS/VS1 or MVS groups; SVS is not supported by CICS/OS/VS 1.5.0 but is supported by earlier releases; memory requirements are highly variable but will probably fall in the range of 64K to 128K bytes of real storage and 32K to 96K bytes of virtual storage; 1 magnetic tape unit is required and 2M to 3M bytes of direct-access storage is required for libraries and work spaces • supports most IBM displays and display control systems in SS, BSC, and SDLC modes; also supports the 3600 group of financial/supermarket/etc systems, the Systems/3/32/34/38/370, OS/6, and 5100 (as a 2770); locally supports the 3270, 3730, and 3790; a FASTER language facility option provides a macro set for running FASTER Transaction Processing Descriptions (TPDs) under CICS; requires additional 20K bytes of virtual storage • included in SSX/VSE 1.4.

5740-XYF Screen Definition Facility CICS 1.2.0 • augments the basic mapping support (BMS) facility integrated into CICS to provide a full-screen editing capability for maps and map sets with a maintenance library; supports all extended attributes (color, highlighting, etc) on 8775 terminals; supports online definition and editing of new maps and map sets for multiple devices; multiple maps can be organized into pages through full page definition/editing facilities; maps expressed in CICS-BMS can be converted to SDF/CICS formats through a batch utility; another utility supports SDF/CICS conversion from online to batch; all build operations are supported by online error-help-tutorial interactive dialog • OS version operates under OS/VS1, or MVS groups with CICS/OS/VS 1.5.0; DOS version operates under DOS/VSE with CICS/DOS/VS 1.5.0 • 1.2.0 available November 1980:

NA/NA initl	**$297/$208 mo**	**$47/$75 serv**
NA/NA OTC		**$47/$75 serv**

5785-DEK Integrated Processing of Data & Text (IPDT) CICS/DOS/VS 2.1.0 • allows the integration of text and data processing directly from end-user workstations • verified under SSX/VSE 1.4; 24-month charge:

2,000/NA	**490/NA**	**NA/NA**
NA/NA		**NC/NA**

5746-XE7 VSE/Access Control Logging & Reporting 1.1.0 • security assistance program for DOS/VSE operations in an interactive environment; provides means to specify access parameters and provides log of accessing activity to protected resources • requires DOS/VSE SCP with VSE/Advanced Functions and 5746-TS1 VSE/ICCF • verified to run under SSX/VSE 1.4:

NA/NA	**59/44**	**2,360/2,125**
NA/NA		**22/35**

5798-DBH CICS/VS ISAM-DL/1 Bridge • FDP; an execution-time interface between CICS-ISAM programs and a DL/1 database; DOS/VS/VSE or OS/VS online (CICS/VS) version of ISAM-DL/1 Bridge (5798-CYT) • requires an operating system selected from DOS/VS, DOS/VSE, OS/VS product lines • currently available; central service not available • license fee is charged for 12 months:

NA/NA	**162/NA**	**NA/NA**
NA/NA		**NA/NA**

5798-DBQ CICS/VS Automated Event Control • FDP; assists in the automatic initiation and control of various time-dependent events in CICS/VS system • requires an operating system selected from DOS/VS, DOS/VSE, OS/VS product lines • currently available; central service not available • license fee is charged for 12 months:

NA/NA	**55/NA**	**NA/NA**
NA/NA		**NA/NA**

5798-DGD System Error Management Facility—CICS/DOS/VSE • FDP; records machine checks and channel checks in hardware error and media error databases; allows real-time analysis of problems with differentiation between media and hardware failures • requires DOS/VSE operating system; operates with CICS/DOS/VS • central service available until 6 months notice; license fee is ongoing:

NA/NA	**55/NA**	**NC/NA**
NA/NA		**NC/NA**

5668-979 Communications Facility/Host 1.1.0 • extends message and transaction routing functions of IBM Series/1 EDX Communications Facility (5719-GF1) to include IBM 4300, System/370, or 30XX host processors; operates with small Series/1 local network • operates with DOS/VSE, OS/VS1, or OS/VS2(MVS) operating system under CICS/VS; communications under control of CICS/VS Version 1.5 and ACF/VTAM or ACF/VTAME; programs required on host include PL/1 Resident Library (5734-LM4 for OS or 5736-LM4 for DOS), PL/1 Transient Library (5734-LM5 for OS or 5736-LM5 for DOS), VSAM; programs required for Series/1 are IBM Series/1 EDX Operating System and IBM Series/1 EDX Communications Facility • initial license charge plus monthly charge:

562/NA	**187/NA**	**NC/NA**
NA/NA		**NC/NA**

Other Communications Software

5668-006 Downstream Load Utility 1.1.0 • provides capability for loading data into the IBM 3644 Automatic Data Unit and/or the IBM 8775 Display Terminal • functions include 2 types of load data applied to system libraries prior to transmission, 3644 Control Storage Load, 3644 Parameter Table Load, 8775 Microcode Load, Load Data Distribution • operates on IBM 4330 or S/370 processors with either the Loop Adapter Feature, the Communication Adapter, the IBM 3705 Communication Controller, tape unit supported by VSE/Advanced Functions, sufficient DASD space • requires either VSE/Advanced Functions current release or current OS/VS1 release • IBM 3644 requires IBM 3644 Parameter Table Generation Facility (GEN 3644) 5668-998:

NA/NA initl	**$116/$87 mo**	**$3,200/$2,400 serv**
NA/NA OTC		**$7/$11 serv**

5746-RC5 Basic Telecommunications Access Method-Extended Support (BTAM-ES) • duplicates BTAM facilities of DOS/VS 1.34.0 with capabilities to operate under DOS/VSE; not compatible with DOS/VS; supports 4331 integrated communications adapter in SS and BSC modes; communications serviceability features of DOS/VS BTAM are optional on BTAM-ES; BTAM application programs must be recompiled to operate under BTAM-ES; operates in System/370 or in ECPS:VSE mode • requires DOS/VSE with VSE/Advanced Functions:

NA/NA	**42/38**	**7/11**
NA/NA		**7/11**

5746-AM5 VSE/3270 Bisync Passthrough • permits any system operating under DOS/VSE to appear as a remote BSC 3271 Controller to any other system; can interact with host systems through ACF/TCAM/VTAM/VTAME, TCAM, VTAM, or BTAM-ES; supports terminal sharing among local and remote CICS/VS host applications; simulates support for up to 32 3270-type displays and printers in conjunction with CICS/VS • requires DOS/VSE with VSE/Advanced Function and requires CICS/DOS/VS 1.1.4:

NA/NA	**173/NA**	**NC/NA**
NA/NA		**NC/NA**

5668-932 FTP (Cross Domain File Transfer Program) 2.2.0 • general-purpose utility program that supports file transmission between nodes or within a node of a VSE-based computer network by using SNA protocols • features include data compression, support of IBM standard-label and unlabeled tape, support of VSAM files, checkpoint/restart and VTAM session recovery facilities, file logging, and trace facility • requires an IBM processor supported by VSE with VSE/Advanced Functions; FTP V.2 is designed to operate with DOS/VSE, VSE/VSAM with advanced communication functions, in addition if the prompter facility is used, VSE/Power V.1 (5666-273) and VSE/ICCF (5746-TS1) are required • availability was July 1983 for FTP V.2

 ©1984 Data Decisions

IBM 4300 Series Distributed (SSX/VSE) Computer Systems
Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

VSE and October 1983 for FTP V.2 prompter facility:

1,500/1,125	270/200	90/144
90/144		90/144

5735-RC5 VCNA (Virtual Machine/VTAM Communication Network Application) 1.1.1 • allows VM/SP users to use SNA BSC or local terminals as console for an operating system that is running under VM as a virtual machine • operates in conjunction with ACF VTAM, ACF VTAME on S/370, 3030, 3080, and 4300 processors running under DOS/VSE with VSE/AF, or OS/VS1 with BPE; at least 1M bytes of memory is recommended • virtual consoles include 4331 display adapter, 8100 DPPX system, 8775, and most current 3271, 3272, 3275, 3276, 3277, 3278, and 3279 dislay models as well as 3284, 3286, 3287, 3288, 3289, 3767, and 3262 printers; verified for operation with SSX/VSE 1.4:

1,100/825	402/302	135/215
NA/NA		NA/NA

☐ Program Development/Languages Assembly

5668-962 OS Assembler H Version 2 1.1.0 • functional replacement for 5734-AS1 OS Assembler H 1.5.0 • includes all the functions of OS Assembler H plus support for bimodal addressing in MVS/XA environment, new channel command word instructions, support for VM/SP in the CMS environment • distinction between 1.5.0 standard, commercial, and scientific instruction sets eliminated; user chooses XA, 370, or Universal sets • runs on any S/370, 30XX, or 4300 processor • included SSX/VSE:

$435/$326 initl	$145/$108 mo	$7/$11 serv
NA/NA OTC		$7/$11 serv

5796-PEJ Assembler H/CMS Interface • IUP • allows VM users to invoke Assembler H; requires Version 5 of Assembler H • requires an operating system selected from VM/370 product lines • IUP currently available; central service not available • license fee is charged for 12 months:

NA/NA	136/NA	NA/NA
1,632/NA		NA/NA

5796-PKD General Cross-Assembler Generator • IUP • collection of programs to assist in the creation of basic program assemblers for a wide variety of computer architectures • requires APL SV or VS APL • IUP currently available; central service not available • license fee is charged for 12 months:

NA/NA	550/NA	NA/NA
NA/NA		NA/NA

RPG

5666-274 SSX/VSE RPG II • prompter supported, SSX-compatible version of 5746-RG1 RPG II 1.3.0; prompters support both installation and ongoing operation:

NA/NA initl	$150/$112 mo	$7/$11 serv
NA/NA OTC		$7/$11 serv

5736-RG1/01 DOS RPG II 1.3.0 • enhanced and expanded version of previous DOS RPG; provides performance improvement in core efficiency for object programs and improved throughput for process-bound programs; many new functions added, some of which are Edit Codes, Chain Operation Code, Spanned Record Format, Look Ahead, ASCII Support, Compile Time Tables, Special Device Support, Bit Operations, Binary Fields, and File Conditioning • supports 2311, 2314, 2319, 3330/3333, and 3340 storage devices and a wide range of card, tape, and printer devices • requires DOS or DOS/VS operating system; verified under SSX/VSE 1.4:

NA/NA	94/NA	2,800/NA
NA/NA		NA/NA

COBOL

DOS/VS COBOL Compiler & Library 1.3.0 & DOS/VS COBOL Object Library 1.2.0 • 1.2.0 complies with ANS COBOL X.2-23-1968; supports ASCII (ANS X3.4-1968) and ANS for Magnetic Tape Labels for Information Interchange (S3.27-1969); 1.3.0 complies with ANS COBOL X3.23-1974, supports ASCII (ANS X3.4-1977) and ANS Labels (S3.27-1978) • 1.3.0 functional capabilities are similar to OS/VS group COBOL; corresponding 3310 and 3370 Sort/Merge product is 5746-SM1; additionally accommodates SAM/VSAM-supported FBA DASDs • operates under DOS/VS, DOS/VSE, and CMS of VM group software; requires DOS/VS 1.34.0 to handle FBA devices; generally compatible with all earlier versions of DOS COBOL • 1.3.0 functional capabilities are similar to 1.2.0 but adds capabilities for VSAM support for alternate indexes and relative record files; supports Federal Information Processing Standard Publication 2-1; 1.3.0 represents IBM's final support for the 1968 ANS COBOL Standard and associated extensions; future IBM COBOL products will not support this standard, but will enhance COBOL standards from 1974 onwards • 1.3.0 included with SSX/VSE 1.4.

DOS/VS Sort/Merge • 2.2.0 supports FBA DASD devices as well as variable-length spanned records, including 3310, 3330/3333, 3340/3344, 3350, and 3370 but not 3375 or 3380; permits command chaining; sorts records from up to 9 input files and can merge up to 9 presorted files; supports all SAM and VSAM data files; allows up to 12 control fields of up to 256 bytes each with a total limit of 4092 bytes; supports EBCDIC or ASCII collating sequences • operate under DOS/VS 1.33.0 and 1.34.0 and under DOS/VSE; VSAM file processing under DOS/VSE requires VSE/AF and DOS/VTAM; requires a minimum of 32K bytes of virtual storage; compatible with DOS/VS group COBOL • 2.40 supports CMS, DOS, SAM, and VSAM files for input/merge, output to CMS or VSAM; variable-length simulated VSE files include RDW (record descriptor words); regular CMS variable length files have no RDW; intermediate work files in CMS on minidisks formatted with 1/2/4K-byte block size; 800-byte block size CMS minidisks not supported for sort function • 2.50 expands control field handling from 12 to 64 and increases total control field length from 256 to 3072 bytes; provides new COPY function, enhanced ADDROUT/OUTREC functions; provides new INREC function and installation (keywords ALTSEQ and CHALT) and control (statements CHALT and NOCHALT) options • included in SSX/VSE 1.4.

FORTRAN

5748-FO3 VS FORTRAN Compiler & Library 1.3.0 • complies with ANS FORTRAN X3.8-1978 and ISO 1539-1980; includes and extends all of the procedures of the preceding FORTRANs; supported by OS/VS1, VM/CMS, MVS group, and DOS/VSE with VSE/Advanced Functions • can operate without alteration in 24-bit mode in MVS/XA environment as well as under MVS/370 systems • provides integrated optimization facilities similar to CS FORTRAN IV (H Extended); cross-operating-system compilation is supported; all source programs written for earlier FORTRAN versions are accepted through a 1966-level option, except that TSO FORTRAN Prompter and FORTRAN Interactive Debug products are not supported • available May 1981 • a prompter supported version runs under SSX/VSE for the same price.

5748-FO3 VS FORTRAN Compiler & Library:

$699/$524 initl	$233/$174 mo	NA/NA serv
NA/NA OTC		$17/$27 serv

5748-LM3 VS FORTRAN 1.3.0 Library • library for 5748-FO3 only; a prompter-supported version of VS FORTRAN 1.3.0 library also runs under SSX/VSE:

207/155	69/51	NA/NA
NA/NA		7/11

BASIC

5796-BCX RM BASIC 1.1.2 • standard Dartmouth BASIC compiler-interpreter with extensions to simplify business applications development:

$225/NA initl	$87/NA mo	NA/NA serv
NA/NA OTC		NC/NA serv

PL/1

5736-LM4 Resident Library • for DOS/PL1 1.6.0 under SSX; verified to run under SSX/VSE:

NA/NA initl	$55/$41 mo	NA/NA serv
NA/NA OTC		$7/$11 serv

 ©1984 Data Decisions

IBM 4300 Series Distributed (SSX/VSE) Computer Systems
Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

5736-LM5 DOS PL/1 Transient Library • a prompter-supported version that runs under SSX/VSE:

NA/NA	32/24	NA/NA
NA/NA		7/11

5736-PL1 DOS PL/1 Optimizing Compiler 1.6.0 • functionally similar to and highly compatible with the OS PL/1 Optimizing Compiler • supports GRAPHICS, a new data type for processing large character sets:

NA/NA	235/176	NA/NA
NA/NA		37/59

5736-PL3 DOS PL/1 1.6.0 • compiler and libraries; a prompter-supported version that runs under SSX/VSE:

NA/NA	322/241	NA/NA
NA/NA		50/80

☐ Program/Applications Development Aids

Development Management System/CICS/VS (DMS/CICS/VS-DOS) 1.3.0 • a significant application program development aid for use under all SCPs; designed to use the facilities of the 3270; use of user interaction is supported through panel description forms (screen builder), file description forms, and data transfer forms; interactive application generation feature supports development from forms base to finished program; provides calculation, edit, and comparison facilities; captures data from up to 16 logically connected panels of displays and consolidates data into a single logical file record or a database path for entry into up to 4 distinct files or databases; supports up to 24 function keys; permits intersystem communications for connecting CICS/VS systems; supports key-sequenced VSAM, SAM, and ISAM files plus special DMS indexed and grouped files; all files supported in fixed-length format; supports CICS implementation of IMS/VS and DL/1 DOS/VS for inquiry, insertion, update, and deletion • requires CICS/VS/DOS under DOS/VS or DOS/VSE; requires CICS/VS/OS and OS/VS1, SVS, or MVS group; DMS-DOS requires VSAM; DMS-OS requires VSAM, ISAM, or DAM; compatible with IMS/VS and with DL/1 DOS/VS.

5746-XC4 • DMS/CICS • for DOS/VS:

NA/NA initl	$179/$134 mo	$51/$82 serv
$4,300/$3,225 OTC		$51/$82 serv

Application Generation Feature • for DMS; option numbers are 6082-6086:

NA/NA	268/200	51/82
NA/NA		51/82

5666-291 ELIAS I 1.2.0 • Entry-Level Interactive Application System for interactive applications development; a prompter-supported version that runs under SSX/VSE:

1,090/819	182/136	14/22
NA/NA		14/22

5666-281 Interactive System Productivity Facility/Program Development Facility for VSE (ISPF/PDF VSE) 1.1.0 • interactive application program development facility, features include multilevel programming library support, full-screen context editing, scrolling in any direction of source data and listings, library and data maintenance routines, dialog test facilities and online tutorial for instruction and reference • requires VSE/AF 3.5.0; 130K bytes of disk and 260K bytes of shared virtual area:

800/600	125/93	15/24
NA/NA		15/24

5668-960 Interactive System Productivity Facility (ISPF) 1.1.0 • dialog manager for interactive applications; provides control and services to support processing of dialogs in different host environments, dialog functions may be written in assembly language or one of the following compilers: 5736-PL1 PL/1 Optimizer, 5746-CB1 COBOL, or 5748-FO3 VS FORTRAN 1.2.0 • requires an IBM processor that meets the minimum requirements for VSE with the Interactive Computing and Control Facility (ICCF), an ICCF partition of 128K bytes (256K bytes recommended), 130K-byte disk, and an IBM 3270 display terminal with 24 lines; software required is VSE operating system with ICCF 1.3.5 5746-XX8 Advanced Function 1.3.5, 5746-XE3 2.1.0, and either the 5746-XX3 ICCF-TTF telecommunication environment (received with ICCF) or CICS/VS • available July 1983; verified to run under SSX/VSE:

749/562	75/56	NA/NA
NA/NA		14/22

5668-918 Cross-System Product/Query 1.3.0 • an interactive query/report writer for use by non-DP trained users • provides access to Virtual Storage Access Method (VSAM) files through menu-oriented dialogues or through a subset of the nonprocedural Structured Query Language (SQL), in either mode the data is presented in tabular form, and a menu-driven dialogue is available to assist the user in formatting the information for report generation • operates on any System/370, 4300, or 3000 Series system with a minimum of 1M byte memory • software requirements under DOS/VSE are CICS/DOS/VS 1.1.5 VSAM 1.2.0, ACF/VTAM 1.0 or 2.0, Cross-System Product/Application Development 1.1.0 and 5668-945 Cross-System Product/Application Execution 1.1.0 under SSX/VSE the software required is 5668-944 Cross-System Product/Application Development 1.1.1 and 5668-945 Cross-System Product/Application Execution 1.1.1 • available September 1983; verified to run under SSX/VSE 1.4:

2,400/1,800	400/300	NA/NA
NA/NA		15/24

5668-944 Cross-System Product/Application Development 1.3.0 • provides an interactive interface for developing, testing, generating, and executing application programs in a CICS/VS, TSO, or VM/CMS envrionment; developed programs can only be executed using Cross-System Product/Execution 1.1.0 (5668-945) • features include interactive definition, test and execution of application programs, trace/debug facility, direct execution of generated CICS applications, call and transfer linkage to other applications and access to user-defined VSAM files • provides query and report writing facilities, terminal support (3178 and 3290), and 4300 and 3000 Series application generation for DPPX/System Product • operates on any System/370, 4300, or 3000 Series processor with a minimum of 1M-byte storage, direct access storage supported by VSAM, tape drive for installation only, and a minimum of one 3270 display station • software required is SSX/VSE 1.1.2 or for operation with CICS/DOS/VS 1.1.5 the operating system required is VSE/SP, 1.1.0, or VS SIPO/E, 1.3.1 or DOS/VSE SCP, with VSE Advanced Function 1.2.0, for operation with CICS/OS/VS, the operating system required is OS/VS2(MVS), 1.3.8 with MVS/SP 1.0 or 2.0 OS/VS1 or 1.7.0 • storage requirements are 280K bytes of virtual storage shared by all users, plus 50K to 150K bytes of virtual storage per terminal • available September 1983; verified to run under SSX/VSE 1.4:

960/720	160/120	NA/NA
NA/NA		32/51

5668-945 Cross-System Product/Application Execution 1.1.0 • used to execute applications developed using 5668-945 Cross Product/Application Development 1.1.1 • requires same hardware and software environment as 5668-944 Cross-System Product/Application Development • storage requirements are 210K-byte virtual storage shared by all executing applications, additional storage required is application dependent • available September 1983:

720/540	120/90	NA/NA
NA/NA		22/35

☐ Other Facilities

Computer Aided Instruction (CAI) for System Software

CAI programs can instruct in any topic, but only those programs instructing a user how to use or how to install a system program are included here. The system IPO packaged software, the SSX/VSE operating system, and many user-friendly program development aids are related to CAI programs.

5668-012 Interactive Instructional Presentation System • successor to 5748-XX6 Interactive Instructional System (IIS); provides environment for maintaining and delivering online instructional materials • requires CICS/OS/VS or CICS/DOS/VS and the appropriate OS/VS1, MVS, or DOS/VSE operating

 ©1984 Data Decisions

IBM 4300 Series Distributed (SSX/VSE) Computer Systems
Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

system; also requires VTAM or TCAM with TSO or VM/CMS, IMS/VS, and 4300, 30XX processors:

$1,100/$825 initl	$251/NA mo	NC/NA serv
NA/NA OTC		NC/NA serv

5668-011 Interactive Instructional Authoring System • provides facilities needed to create and maintain computer-based training courses • requires 5668-012 IPS; IIAS is successor to 5748-XX6 IIS, and all courses running under IIS will also run under IPS and IIAS; requires CICS/OS/VS or CICS/DOS/VS running together with their prerequisite OS/VS1, MVS, DOS/VSE 1.2.0 or DOS/VS operating system and IMS/VS or DL/1:

NA/NA	430/NA	NC/NA
NA/NA		NC/NA

Computer-Aided Instruction for System Software 5748-XX6 Interactive Instructional System • a general-purpose computer-aided instruction (CAI) system that serves as an umbrella for specific courses; programs available include instruction in system software as well as general educational topics:

NA/NA	544/NA	NC/NA
NA/NA		NC/NA

5798-DDX Introduction to VSE/Interactive Computing & Control Facility (ICCF) • FDP; computer-aided instruction course in usage of the 5746-TS1 VSE/Interactive Computing and Control Facility • requires 5668-012 Interactive Instructional Presentation System or 5748-XX6 Interactive Instructional System plus an operating system from the OS/VS1, MVS, VSE, or VM product families with 370 architecture; information not yet available on whether compatible with XA architecture • currently available; central service available until August 1982 • license fee is charged for 12 months:

NA/NA	55/NA	NC/NA
NA/NA		NC/NA

Graphics

5748-XXH Graphical Display Manager (GDDM) 1.4.0 • full-screen manager support and presentation graphics for 3278, 3279, and 8775 terminals as well as associated 328X printers; displays or prints lines, arcs, areas; 64 shades of colors; provides 26 unique patterns, can mix graphic and alphanumeric data • requires IMS/VS with or without TSO, VM/CMS, CICS/OS/VS, CICS/DOS/VS, CICS/DOS/VSE, or VSPC V.2:

$715/$536 initl	$139/$112 mo	NA/NA serv
NA/NA OTC		$33/$53 serv

5748-XXH Presentation Graphics Feature • extends ease-of-use features, particularly with regard to pie charts, line graphs, surface charts, Venn diagrams, histograms, or bar charts:

715/536	151/113	NA/NA
NA/NA		33/53

5799-BPF (PRPQ #7B0891) VSE Business Graphics Facility • supports presentation of business data in graphic form on a display station, printer or plotter • features include menu-driven access to functions, prompts/defaults, and HELP text • functions available are pie and bar charts, line graphics, histograms, surface charts, and scatter plots • plots can be in 4 colors, 7 fonts, 16 fill patterns, and 4 line types with 3 line widths • designed to operate on any processor that supports VSE/SP or SSX/VE; can use 3278 or 3279 displays, 3287 printer, or an XY/750 plotter • software required is VSE/SP 1.1.0, or SSX/VSE 1.3 or 1.4, and the PL/1 Library (5736-LM4 and 5736-LM5) • available June 1984:

NA/NA	NA/NA	NA/NA
3,000/NA		NA/NA

Document Processing

5746-DC1 VSE/3890 Document Processor Support 1.1.0 • reads and stacks banking documents using the 3890 Document Processor; includes stacker control instructions • requires VSE/AF 1.2.0 and later releases; verified under SSX/VSE 1.4:

NA/NA initl	$112/NA mo	$2,000/NA serv
NA/NA OTC		NA/NA serv

5748-XXE Document Library Facility 1.2.0 • supports storage of text documents and data; designed to operate in conjunction with 5748-XX9 Document Composition Facility, ATMS-III, SCRIPT/VS, and VSAM • requires DOS/VSE SCP with VSE/AF 1.2.0; also requires VSAM or VSE/VSAM; verified under SSX/VSE 1.4:

452/NA	150/NA	NA/NA
NA/NA		NC/NA

5748-XX9 Document Composition Facility 1.2.0 (SCRIPT/VS) • text processing program for interactive or batch mode production of typeset text; input from computer terminals can be printed out on 3800 multiple-font printer or 1403, 3211, 3203, or equivalent single-font printers • for batch mode, requires DOS/VSE SCP with Document Library Facility • a prompter-supported version runs under SSX/VSE; verified under SSX/VSE 1.4:

NA/NA	303/NA	NA/NA
NA/NA		NC/NA

Decision Support

5666-311 IBM Decision Support (DS)/VSE 1.1 • application package designed to improve the business professional's productivity using VSE system; includes the new DS/VSE Productivity Facility SQL/DS, OMF/VSE, and GDDM which complement VSE/SP 2.1 and SSP/VSE 1.4 • uses intelligent workstation support of VSE/SP 2.1 and SSX/VSE 1.4 and supplies bridge between SQL/DS database and GDDM Interactive Chart Utility • a recommended configuration includes 6M bytes of real storage; minimum required is 4M bytes • planned availability is April 1985 under SSX/VSE 1.4 • current charges for QMF/VSE, SQL/DS, and GDDM apply; the DS/DSE Productivity Facility is charged separately:

NA/NA initl	NA/NA mo	NA/NA serv
$3,075/$2,770 OTC		$171/$154 serv

■ HARDWARE

□ Terms & Support

Terms • the 4321, 4331, and 4341 processors are available from IBM on a purchase, 30-day rental, or 2-year lease basis; the 4361 is not available under the 2-year lease • IBM Credit Corp, a separate company, supplies long-term leases of up to 5 years on all 4300 systems • lease plan cancellation charge is the smaller of lease fees for 5-month period or for 25% of the remaining term; IBM guarantees no more than a 5% rate increase per year for lease contracts • rental or lease plans allow for unlimited use • individual peripherals and terminals may be governed by other terms, but the majority follow the Processor terms; exceptions are noted in the text.

Support • IBM markets and supports the 4300s through a nationwide network of local offices • maintenance is bundled into rental or lease charges, and priced separately for purchased systems • basic monthly maintenance charge stated in following text provides for service availability on a Monday through Friday, 7:00 AM to 6:00 PM, 9 consecutive hour basis; various extensions to such service for weekends and before/after standard hours are quoted at percentage premiums over the basic rate • full 7-day 24-hour service adds a 39% premium to the basic rate • partially bundled; basic training is included in pricing with more extensive instruction at extra cost • optional Remote Support Facility (RSF) allows service personnel to remotely control a 4300 by means of a RETAIN terminal, and to access the RETAIN data bank for service information; no charge for RETAIN modem and terminal, but customer must provide telephone lines and arrange for connection of the telephone interface cable.

Remote Operator Console Facility (ROCF) • an extension of the standard Remote Support Facility (RSF) that allows a host operator to IML, IPL, and control a remote 4300 by means of a 3275 or 3275 emulation terminal used as a remote console; after IML and IPL, the remote console is disconnected and the system is operated in standalone mode; operation of other devices on the display/printer adapter is suppressed while ROCF is in use • a new feature for 4361 is an integrated modem to support both RSF and the ROCF features; data rate of 4800 bps can now be ordered.

 ©1984 Data Decisions

IBM 4300 Series Distributed (SSX/VSE) Computer Systems
Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

1200 AutoStart • feature providing pre-programmed power-on, remote power-on by telephone via ROCF, and re-power-on after outage; sets time-of-day clock from battery operated clock and optionally IPLs system; available on new 4361 processors in April 1985:

$70/NA mo	$1,200 prch	$5,000.00 maint

RPQ7B0987 AutoStart • available for field installation October 1985; processors shipped before April 1984 require RPQ7B0987 as prerequisite:

NA/NA	2,770	NA

☐ Systems Overview

All 4300 Series processors are uniprocessor systems. The 4321 and 4331 systems are built around the same processor. The 4321/4331 processors also can be field upgraded to the 4361, even though the base CPU has noticable differences, because the external I/O interfacing, integrated adapters, I/O loops, and channels are upward compatible. IBM supports field upgrades of models 4321 and 4331 to 4361-5 but not to 4361-4. The 4321/4331, and 4361 processors must be swapped out in order to be upgraded to the 4341 or the 4381 because the I/O adapters and loops (and many of their associated peripherals) are not compatible with the wholly channel-oriented I/O of the 4341 and 4381.

The 4361-3 is the new entry-level system into the 4361 product line. The 4321 and 4331-2 are in limited new production as of September 10, 1984. New orders for the 4321 and 4331 will not be accepted after December 31, 1984.

Software compatibility for these processors is complex to describe because of the number of operating environments. In addition, the processing mode microcode can limit the operating system compatibility as noted in the following discussion. The user must also match new peripherals with new releases and versions of operating systems, device support programs, communications programs etc. The number of terminals, peripherals, and programs is such that this level of compatibility can only be roughly indicated by mentioning the level of operating systems supported on each processor.

Each processor's operating environment is defined at IPL time by a microcode set that expedites operations for some operating systems and precludes or complexes the running of others. These basic modes are as follows.

A new programmable power-off function for 4361 allows the processor to be shut down under program control.

Extended Control Program Storage (ECPS):VSE Mode • the native mode for 4321, 4331, 4341, and 4361 CPUs but not for the 4381 • supports DOS/VSE; is required by DOS/VSE 1.3.0 and higher, DOS/VSE operating with Advanced Functions 1.1.0 or 1.2.0 and higher (DOS/VSE/AF 1.1.0 and 1.2.0); is also required by SSX/VSE.

System/370 Mode • not covered in this report • can be invoked on all 4300 models • in general, this mode supports VM/370 with or without VM/SP (any release), VM/BSE 1.2.0, or VM/SE 1.2.0; supports OS/VS1 1.7.0 with or without VS1/BPE; supports DOS/VSE 1.1.0 or 1.2.0 with or without Advanced Functions 1.1.0 or 1.20 providing they have been generated to run in S/370 mode • operation of VM is assisted by nonmandatory ECPS:VM/370 microcode; operation of OS/VS1 is assisted by nonmandatory ECPS:VS1 microcode • also supports MVS/SP V.1 (all releases) in conjunction with MVS 1.3.8 but this operating system requires ECPS:MVS microcode to provide the extra 14 privileged instructions associated with all MVS versions.

4321 • any SSX/VSE release, and DOS/VSE 1.3.0 in ECPS:VSE mode; VM/SP in System/370 mode.

4331 • all ECPS:VSE-supported environments; all DOS/VSE and VM environments compatible with System/370 mode; OS/VS1 in 370 mode on the 4331-1 and 4331-2 but not the 4331-11.

4361 • can be conditioned to be viewed by the operating system as a 4331-2, and then can run all 4331-2 operating systems and modes; OS/VS1 R.7 requires OS/VS1/BPE R.4 but this release does not support the 4361-5 Start I/O Fast Release (SI/OFR) instruction or enhanced recovery procedures; SI/OFR and enhanced recovery are supported on all 4361 models under VSE/SIPO/E 1.4 with VSE/SP 1.1; VSE/AF 1.3.5, SSX/VSE 1.4, and VM/SP 1.3.0 in all appropriate modes; MVS 3.8 with MVS/SP 1.3.2 supports only the 4361-5 model in S/370 mode with the required ECPS:MVS microcode.

System Minimums/Maximums

System Minimums • a basic system that permits hardware maintenance for the 4300 includes a processor (and associated prerequisites as described under Packaged Components), card image I/O device, a hardcopy output device, and 1 of several disk/tape combinations • card image device can be a card reader, an I/O diskette (other than the system diskette), or a tape unit with card image capabilities • permissible disk/tape combinations include 2 removable disk drives; 3 tape units; a removable disk drive plus 2 tape units; or a fixed disk unit plus 1 tape unit • see Figure 1 for maximum configuration.

Expansion • accomplished by processor model changes to add memory and by attaching additional S/370-type I/O channels.

4321, 4331 & 4361 Expansion • rules for adding peripheral subsystems and additional features are complex due to mutually exclusive features, and the choice of a wide variety of attachment methods; on 4321 and 4331, complexity is increased due to involved calculations needed to ensure that microcode capacity and compatibility are not violated, due to calculations needed to ensure power supply capacity is adequate • supporting remote terminals involves selecting between attachment via integrated communications adapters; channel-attached controllers; and integrated loop adapters; typically the integrated adapters will be used due to cost and throughput considerations; 3705 attachment not recommended although physically possible.

4321 System Maximums • 1M-byte main memory; no cache; 128K-byte reloadable control storage standard; 4 integrated adapters standard, but no optional integrated adapters, channels, or loops; data communications adapter attaches 3 lines; DASD adapter attaches up to 1.0G bytes of disk storage on 4 strings (16 drives); tape adapter attaches 6 drives; display/printer adapter attaches 16 terminals • packaged system.

4331-11 System Maximums • 2M-byte main memory, 4K-byte cache, 128K-byte reloadable control storage standard; 4 integrated adapters standard and 1 optional; 1 byte and 1 block multiplexer standard but none optional; data communications adapter attaches 3 to 8 lines; DASD adapter attaches up to 9.12G bytes of disk storage on 4 strings (16 drives); tape adapter attaches 6 drives; display/printer adapter attaches 16 terminals • packaged system.

4331-2 System Maximums • 4M-byte main memory; 8K-byte cache, 12K-byte ROM; 128K-byte reloadable control storage • 7 integrated adapters chosen from 8 different types; 1 byte multiplexer channel, 2 block multiplexer channels, 1 high-speed channel; terminals attach by means of 2 loop and 2 data link adapters for remote loops as well as by means of the display/printer adapters and communications lines.

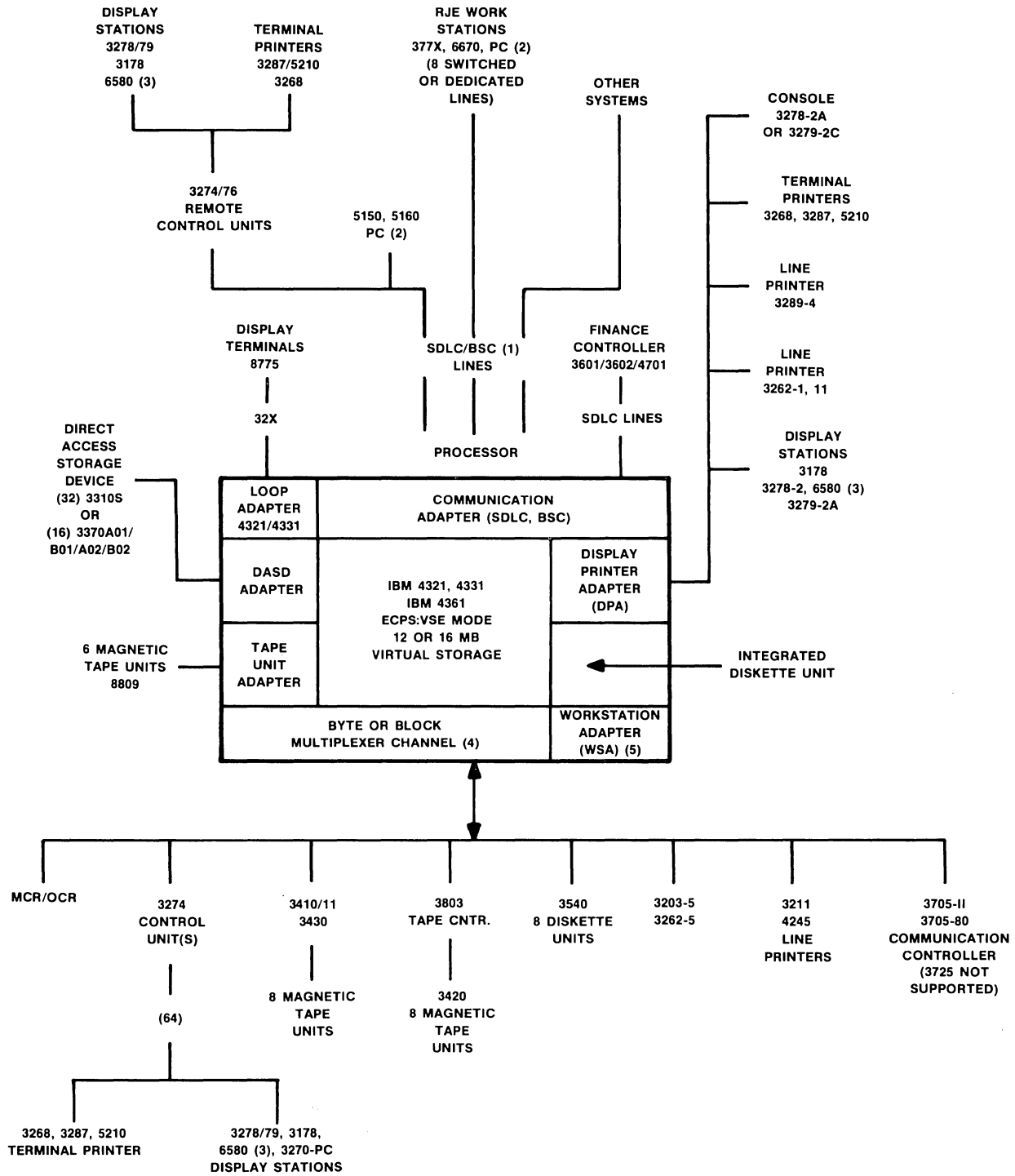
4361-3 System Maximums • 2M- or 4M-byte main memory, up to 3 channels S/370 I/O interfaces with maximum of 1 high-speed BMPX channel, up to 2 DASD/8809 adapters to attach up to 4 3310 or 3370-A01/B01/A02/B02 DASDS each; BMPX data rate limited to 1.86M bytes per second and it cannot attach DASDs; high-speed BMPX precludes second DASD/8809 Adapter; optional integral communication adapter can attach up to 8 switched or nonswitched communication lines; optional integrated Display Printer Adapter (DPA) can attach up to 16 displays or printers; Optional Work Station Adapter (WSA) can attach the same devices (up to 32) as the local 3274 control unit

MO: first figure is monthly rental charge; second figure is monthly charge for 2-year lease; both include maintenance. PRCH: purchase price. MAINT: monthly maintenance charge for purchased systems. NA: not available or applicable. NC: no charge. Purchase prices, rental/lease and maintenance prices effective as of October 1984 unless indicated otherwise.

 ©1984 Data Decisions

IBM 4300 Series Distributed (SSX/VSE) Computer Systems

Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5



(1) ONLY SDLC LINES ARE PREGENERATED IN SSX/VSE.

(2) THE IBM PERSONAL COMPUTER IS SUPPORTED IN 327X or 377X COMPATIBILITY MODE DIRECTLY ATTACHED TO THE COMMUNICATION ADAPTER.

(3) THE IBM 6580 DISPLAYWRITER IS SUPPORTED IN 3278 COMPATIBILITY MODE.

(4) NUMBER OF I/O CHANNELS VARIES WITH SYSTEM.

(5) WSA SUPPORTS SAME DEVICES AS IBM 3274; WSA + DPA CAN ATTACH 40 TERMINALS; AVAILABLE ONLY ON 4361 MODELS.

Figure 1 • 4300 Series maximum configuration.

 ©1984 Data Decisions

IBM 4300 Series Distributed (SSX/VSE) Computer Systems
Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

as well as the SOEMI feature; when WSA installed DPA limited to 8 workstations for a combined total of 40 local workstations connected to combined WSA and DPA • DASDs limited to fixed block format; count-key-data (CKD) and driver attachment of 3340-44 is not supported on 4361-3.

4361-4 System Maximums • 4M- to 12M-byte main memory; 8K-byte cache buffer, 16K-byte reloadable control storage; 1 low-speed block multiplexer channel standard; 1 byte and 2 high-speed block multiplexer channels optional • optional data communications adapter attaches up to 8 lines; up to 3 optional DASD/8809 adapters, each attaching up to 4 strings of 3310, 3340, or 3370 disks or 8809 tape drives; optional display/printer adapter handles up to 16 displays and printers; up to 4 8100-/4331-type R-loops and data link adapters are RPQ items • note that attachment of DASD adapters and high-speed channels impact each other's memory cycle time • Optional Work Station Adapter (WSA) can attach the same terminals as those on the 3274 Local Control Unit; when WSA attached DPA can support only 8 displays and printers for a total of 40 local work stations • see I/O.

4361-5 System Maximums • same as 4361-4 except that cache is expanded to 16K bytes, and 2 extra channels or a DASD adapter can be added • the 4361-5 also includes a Start I/O Fast Release instruction and optional ECPS:MVS microcode not available to 4361-4.

Performance

4321 • the same power as the 4331-1, or about 0.20 MIPS, according to IBM.

4331-11 • provides about 1.5 times the power of the 4331-1 and 4321, according to IBM • about 0.30 MIPS • performance increase for scientific processing is significantly higher (i.e., 2.0) to 2.5 times the power of the 4331-1/4321, or roughly equal to the 4331-2.

4331-2 • provides about 2 times the processing power of the 4321 or 4331-1 • about 0.42 MIPS, according to IBM.

4361-3 • provides about the same power as the 4331-2 for commercial applications and 1.4 (short precision) and 2.2 (long precision) times the performance of 4331-2 for engineering/scientific performance using the floating-point multiply accelerator feature • about 0.42 MIPs for commercial applications.

4361-4 • provides about 2.4 times the power of the 4331-2; about equal to the 4341-11 estimated at 1.0 MIPS • more specifically, according to IBM, the 4361-4 is 2.4 times the 4331-2 under VSE with VSE/AF in ECPS:VSE mode or 2.1 times 4331-2 under OS/VS1 for commercial workloads in primarily batch and database/data communications environments; 2.9 times the 4331-2 under VM/CMS in ECPS:VM active mode for primarily interactive workloads; 3.5 times the 4331-2 for **short precision** engineering/scientific batch workloads under VSE(SCIFORT) and 6.7 times the 4331-2 for **long precision** in the same environment.

4361-5 • provides about 2.1 times the power of the 4331-2; about 1.4 times the power of the 4361-4 • estimated at 1.3 MIPS.

☐ Packaged Systems

4321 & 4331 Packaged Systems

The 4321 and 4331-11 systems are packaged to a far greater extent than their 4331-1 predecessors and 4331-2 upgrade. Channels and/or integrated adapters and a number of processor features are included in the basic system package. Information on the 4331-1 is presented together with the appropriate 4321/4331-11/4331-2 descriptions for comparison purposes, although the 4331-1 is no longer available from IBM.

4321-J11 • 1M-byte main memory; no cache; 128K-byte control storage; 1 DASD adapter, 1 8809 tape adapter, 1 display/printer adapter, 1 3-line communications adapter standard • no optional features:

$4,765/NA mo	$48,000 prch	$301.00 maint

4331-J11 • 1M-byte main memory; 4K-byte cache; 128K-byte control storage; 1 byte multiplexer channel, 1 block multiplexer channel (1.25M bytes per second); 1 DASD adapter, 1 8809 tape adapter, 1 display/printer adapter, 1 3-line communications adapter standard; processor options include only 5 additional line groups (see Communications section) and integrated diskette (see Disks section); some features optional to 4331-1 are standard to 4331-11, and other 4331-1 features are not available on 4331-11; see 4331-1 processor options, I/O options, and memory options for an itemization of which 4331-1 options are standard or unavailable to the 4331-11:

5,534/4,710	57,420	351.00

4331-K11 • 2M-byte main memory; otherwise same as 4331-J11:

6,092/5,185	64,920	377.00

4331-L11 • 4M-byte main memory; otherwise same as 4331-J11:

7,208/6,135	79,920	429.00

4331-2 • includes 1M to 4M bytes of memory, but no cache; can add 6 integrated adapters chosen from 8 types; can have 2 S/370-type I/O multiplexer channels (1 byte, 1 block); can attach 2 8100-type loop adapters, 2 data link adapters, and 8-line data communications adapter; data link adapters each support 1 to 4 remote loops; also can have 2 to 4 System/370-type I/O channels, including 1 byte multiplexer channel, 1 high-speed block multiplexer channel, and 2 lower-speed block multiplexer channels (see I/O).

4331-JO2 • 1M-byte main memory; 8K-byte cache:

6,709/5,710	41,705	343.00

4331-KO2 • 2M-byte main memory; 8K-byte cache:

7,267/6,185	49,205	369.00

4331-KJ2 • 3M-byte main memory; 8K-byte cache:

7,825/6,660	56,705	395.00

4331-LO2 • 4M-byte main memory; 8K-byte cache:

8,383/7,135	105,000	421.00

4361-3 Group • basic systems include 2M or 4M bytes of main memory, 1001 Adapter Power Prerequisite, 1901 Control Storage Expansion, 2001 Display Printer Adapter (DPA), DPA Expansion 3401 Integral Diskette Drive, 3898 External Signals, 5531 Power Interface, 5532 Additional Power Interface, 8701 EPS:VM/370, ECPS:VSE, High-Accuracy Arithmetic Facility, Serial OEM Interface, and Programmable Power-off • optional features include BMPX, BMX, High-Speed BMPX, 1100 Floating-Point Multiply Accelerator, 1200 Auto Start, 2002 Work Station Adapter (WSA), up to 2 DASD/8809 Adapters.

4361-3 K3 • 2M-byte main memory:

3,531/NA	56,500	295.00

4361-3 L3 • 4M-byte main memory:

4,647/NA	71,500	347.00

1100 Floating-Point Multiply Accelerator • optional for 4361-3; executes frequently used floating-point multiply instructions in VLSI gate array hardware rather than microcode; provides improvement in instruction execution speed by factors of 3 to 8 • with Elementary Math Library (EML) PRPQ mathematical functions are assisted by microcode to improve performance:

485/NA	8,500	20.00

5799-BTB Elementary Math Library (EML) • PRPQ P81005; a set of mathematical subroutines used for selected functions as alternatives to VS Fortran Mathematical Library • components include: square root, exponentiation, common and natural logarithms, selected trigonometric and inverse trigonometric functions, complex absolute value, and power function:

NA/NA	300	NA

4361-4 Group • basic systems include 2M, 4M, 6M, 8M, or 12M bytes of main memory; 8K-byte cache • 1 1.25M-byte-per-second block multiplexer channel; channel expansion capabilities allowing for addition of 1 byte and 3 3.0M-byte-per-second block multiplexer channels • optional loops and integrated adapters include 1 display/printer adapter, 1 Work Station Adapter, disk/8809 tape combination adapter, 8-line communications

 ©1984 Data Decisions

IBM 4300 Series Distributed (SSX/VSE) Computer Systems
Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

adapter, 2 (RPQ) R-loops, and 2 (RPQ) data link adapters.

4361-K4 • 2M-byte main memory; 1 I/O channel; 8K-byte cache memory:

8,500/NA	**135,000**	**490.00**

4361-L4 • 4M-byte main memory; 1 I/O channel; 8K-byte cache memory:

9,616/NA	**150,000**	**542.00**

4361-LK4 • 6M-byte main memory; 1 I/O channel; 8K-byte cache memory:

10,732/NA	**170,000**	**594.00**

4361-M4 • 8M-byte main memory; 1 I/O channel; 8K-byte cache memory:

11,848/NA	**185,000**	**646.00**

4361-ML4 • 12M-byte main memory; 1 I/O channel; 8K-byte cache memory:

14,080/NA	**215,000**	**750.00**

4361-5 Group • basic systems include 2M, 4M, 6M, 8M, or 12M bytes of memory; 16K-byte cache • 2 1.25M-byte-per-second block multiplexer channels and 1 byte multiplexer channel; channel expansion capabilities allowing for addition of 3 3.0M-byte-per-second block multiplexer channels • optional loops and integrated adapters include display/printer adapter, 1 Work Station Adapter, disk/8809 tape combination adapter, 8-line communications adapter 2 (RPQ) R-loops, and 1 (RPQ) data link adapters.

4361-K5 • 2M-byte main memory; 3 I/O channels; 16K-byte cache memory:

11,300/NA	**180,000**	**590.00**

4361-L5 • 4M-byte main memory; 3 I/O channels; 16K-byte cache memory:

12,416/NA	**195,000**	**642.00**

4361-LK5 • 6M-byte main memory; 3 I/O channels; 16K-byte cache memory:

13,532/NA	**210,000**	**694.00**

4361-M5 • 8M-byte main memory; 3 I/O channels; 16K-byte cache memory:

14,648/NA	**225,000**	**746.00**

4361-ML5 • 12M-byte main memory; 3 I/O channels; 16K-byte cache memory:

16,880/NA	**255,000**	**850.00**

Consoles

Two consoles are supplied for the 4300 series, the 3278-2A as the required system console, and the 3279-2C as an optional programming support console.

3278-2A Display Console • 1920-character A/N system console display for 3080 series and 4300 systems; 7x14 dot matrix, 96-character set, upper-/lowercase • 24 rows of 80 characters each with the first 20 rows usable by the operator, the bottom 4 are for system status information • provides manual control of the system, error messages to the operator, power-off, IML, and start/stop:

$126/$108 mo	**$2,505 prch**	**$18.50 maint**

4641 75-Key Keyboard:

49/42	**909**	**5.50**

6340 Security Keylock:

35/NA	**35**	**NC**

3279-2C Display Console • programming support console • color, 1920-character A/N console display • 4 colors are white, red, blue, green • 9x12 dot matrix, 96-character set, upper-/lowercase • 24 rows of 80 characters each with the first 20 rows usable by the operator; the bottom 4 are for system status information • provides manual control of the system, error messages to the operator, power-off, IMC, start/stop, power-on:

195/166	**3,615**	**39.50**

4631 Operator Console Keyboard • 75 keys, with channel-to-channel feature (required for system with a channel adapter):

51/43	**977**	**5.50**

4632 Operator Console Keyboard • no channel-to-channel control key or disabled indicator; otherwise same as 4631:

49/42	**909**	**5.50**

4633 Operator Console Keyboard • no operator control panel otherwise same as 4631:

22/19	**472**	**4.00**

6340 Security Keylock:

NA/NA	**35**	**NC**

☐ CPUs

4321 CPU • microprogrammed asynchronous processor, with microinstruction execution rate ranging from 300 to 1600 nanoseconds; microinstructions that address main memory can require as much as 4000 nanoseconds to execute • main processor functional elements are a 4-byte-wide ALU (32-bit data paths), 2K bytes of local data storage, a System/370 instruction buffer, readable control storage of 64K bytes expandable to 128K bytes on 4331-1 and standard (nonexpandable) 128K bytes on 4321; op register and decode logic; up to 8 trap levels for logical and I/O tasks plus the processor on the 9th trap level; a translation look aside buffer aids in instruction prefetch and address conversions; the cycle-stealing integrated channel bus system is discussed under I/O • 2 processing modes are supported: ECPS:VSE for DOS/VSE and SSX/VSE software, or S/370 mode for DOS/VSE, OS/VS1, or VM/370; S/370 can also add ECPS:VM/370 microcode assist.

4331-11 CPU • same basic processor architecture as with 4321 except that processor elements include 4K-byte cache memory for higher speed.

4331-2 CPU • microprogrammed asynchronous processor, with microinstruction execution rate ranging from 300 to 1600 nanoseconds; microinstructions that address main memory can require as much as 4000 or as low as 200 nanoseconds to execute • main processor functional elements are a 4-byte-wide ALU (32-bit data paths), 2K bytes of local data storage, a System/370 instruction buffer, readable control storage of 64K bytes expandable to 128K bytes; op register and decode logic; up to 8 trap levels for logical and I/O tasks plus the processor on a 9th trap level; a translation look-aside buffer aids in instruction prefetch and address conversions; the cycle-stealing integrated channel bus system is discussed under I/O • 2 I/O ring buses and 2 entries per trap level both support heavier I/O loads than 4321 or 4331-11 models; additional 128-byte local storage duplicates the general register set to allow simultaneous fetch of 2 register operands as well as floating-point acceleration and condition-code generation • 4331-2 CPU also has standard ROM for RCS overflow.

4361-3 CPU • probably the same CPU as for the 4361-4 and -5 but without cache memory; manuals unavailable until December 1984.

4361 CPU • partially microprogrammed asynchronous bus-centered processor implementation with 100-nanosecond processor cycle • 70 instructions implemented in hardware, remaining microcoded instructions stored in control store and in cache; hardware floating-point arithmetic processor supported by 20 new instructions; new Start I/O Fast Release instruction and improved recovery procedures; prefetch pipeline; cache memory located in CPU module rather than memory module thus allowing CPU to work out of cache without contending with I/O for the centralized bus.

☐ Memory

4321 Memory

4321 Basic Memory • 1M bytes included in processor package; fetch time of 900 nanoseconds and cycle time of 1300 nanoseconds for 4 bytes; memory refresh rate of 11.2 microseconds, refresh duration of 1.0 microsecond; 64K-bit memory chips on all 4321 and 4331 processors; no memory interleaving; no cache buffer; no read-only memory.

 ©1984 Data Decisions

IBM 4300 Series Distributed (SSX/VSE) Computer Systems
Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

4331 Memories

4331-11 Basic Memory • 1M- or 2M-byte processor submodels; memory upgrade is done through processor upgrade; same performance characteristics as 4321 memory, no read-only memory, but 4K-byte cache buffer.

Control Buffer (All Models) • 64K bytes; 4-byte-wide control word; 100-nanosecond buffer access time.

4321 & 4331-11 Reloadable Control Storage • 128K bytes are standard; no RCS options; RCS refresh rate is 50 nanoseconds; refresh duration is 400 nanoseconds • in addition to microcode in RCS; 168K bytes or more of processor storage are occupied by system microcode.

4331-11 Cache Buffer • 4K-byte buffer included in all systems; fetch and store cycles are 200 nanoseconds for 4 bytes; all instructions, operands, and results are fetched and stored from the cache buffer only; data not found is transferred to main memory; only changed data is restored in main memory.

4331-11 Read-Only Memory • 12K bytes of ROM standard.

4331-2 Memories

Basic Memory • included in each processor submodel; memory upgrades are done by processor upgrades; 1M-byte to 4M-byte range; main memory to cache fetch time is 2.6 microseconds for 64 bytes; store time is 3.1 microseconds for 64 bytes; 64-byte cache reloading represents 8 4-byte-wide transfers; all systems use 64K-bit chip technology for main memory; no interleaving.

Cache Buffer • 8K-byte buffer included in all systems; cache to CPU fetch and store cycles are 200 nanoseconds for 4 bytes; all instructions, operands, and results are fetched and stored from the cache buffer only; data not found is transferred to main memory; only changed data is restored in main memory.

Control Buffer • 64K bytes; 1 4-byte-wide control word; 100-nanosecond buffer access time.

Reloadable Control Storage • 128K bytes are standard with every 4331-2; no RCS options; RCS refresh rate is 50 nanoseconds; refresh duration is 400 nanoseconds.

Read-Only Memory • 12K bytes of ROM standard.

4361 Memories

Basic Memory • 2M, 4M, 6M, 8M, or 12M bytes included in each processor submodel; memory upgrade is done by processor submodel upgrade • main memory to cache fetch cycle of 1.9 microseconds for 64-byte blocks, store cycle of 2.2 microseconds for 64-byte blocks; 8-byte/64-bit central bus data paths between memory and CPU or I/O processor; 64K-bit memory chips.

Cache Buffer • 8K bytes on 4361-4; 16K bytes on 4361-5; 100-nanosecond cycle time for 4 bytes • note that this high-speed buffer is used for microcode storage as well as for a main memory cache.

Reloadable Control Storage & 370 Instruction Buffer • 16K bytes of control storage; 370 instruction buffer contains 70 most used System/370 instructions implemented in hardware; the microcoded instructions reside in the reloadable control storage and in the cache buffer.

Three Port Local Store • CPU buffer.

□ I/O

4321 & 4331 Internal I/O Buses & Integrated Adapters

All 4321 and 4331 integrated I/O adapters, I/O loops, and external I/O multiplexer channels are connected by the internal "ring bus" to a single cycle-stealing channel controlled by the processor, 4321 and most 4331 processors have 1 ring bus that can support 6 adapters and 2 channels; 4331-2 has 2 ring buses. In both processor groups, 1 support processor adapter and 1 power interface adapter are standard in addition to the I/O adapters. The 4321 has no optional I/O multiplexer channels.

The first of the 2 4331-2 ring buses can connect 1 byte multiplexer, 1 communications adapter, the 8809 tape unit adapter or 1 standard block multiplexer, and the DASD adapter of 1 high-speed or standard-speed multiplexer, for a total of 4 I/O interface paths. The second 4331-2 ring bus can connect 1 standard-speed block multiplexer, 1 DASD adapter, and 1 I/O subsystem adapter, which in turn attaches more adapters; this ring always connects the support subsystem adapter which connects the support bus. The support bus is a key system element which attaches the console display/printer adapter, the support bus adapter; 1 support processor, and the power control interface. The support bus can also attach a diskette adapter for a user diskette and supports 15 additional displays and printers on the display/printer adapter, the I/O subsystem adapter can connect a second support processor plus 4 more adapters, either 1 5424 card unit or 2 loop adapters and 2 data link adapters.

I/O device controllers on the 4331-11 can transfer data through S/370-compatible, buffered byte and block multiplexer channels; these connect to main memory by means of a single integrated channel mediated by processor circuitry and system microcode. All 4331 CPUs have 2 channels of this type in addition to integrated adapters, but the 4331-11 channels operate at lower speeds than the highest speed 4331-2 channels and hence support only lower-speed disks.

4361 Internal Buses & Integrated Adapters

The 4361 is a true bus-centered system since the CPU, memory, and channel set connect to the same centralized bus, but the I/O interfacing is so similar to the 4331 "ring bus" that the 4331 can be field upgraded to the 4361. Most of the same 4331 integrated channels, adapters, and loops can be attached to the 4361. Notable exceptions are the DASD and 8809 individual 4331 adapters which are combined on the 4361 into 1 unit; and the high-speed, data-streaming block multiplexer channels found on the 4361 but not on the 4331. The Display Printer Adapter (DPA) is included on all systems. The Work Station Adapter (WSA) is available only on the 4361.

4321, 4331 & 4361 I/O Options:

3898 External Signals • provide 6 external interrupt lines; external devices must meet System/360 direct control specifications; included in 4361 models:

$12/NA mo	$225 prch	$1.50 maint

Integrated Adapters & Loops • integrated I/O adapter types include a 3310/3340/3370 DASD adapter, 8809 tape adapter, diskette adapter, 5424 card unit adapter, display/printer adapter; data communications line adapter, 2 local loop adapters, and 2 data link adapters oriented toward displays, printers, and data collection subsystems • these adapters are oriented toward particular I/O devices • pricing and descriptions for the adapters are presented in the appropriate I/O section; RPQ for 4361.

5248 Byte Multiplexer Channel • optional on 4321 and 4361, standard on 4331-1, 4331-2, and 4361; supports up to 8 control units for S/370 byte multiplexer devices, maximum data transfer rates are mode and processor dependent; 18K bytes per second for 4331-1 in byte-interleaved mode, 36K bytes per second for 4331-2 and 4361 in byte-interleaved mode, and 500K bytes per second in burst mode for all processor groups; cannot support magnetic tape devices when 2311/2314/2319 disks are on 1421 block multiplexer channel; see 5531/5532 power interface for devices requiring power interfaces:

141/NA	2,665	3.00

1421 Block Multiplexer Channel • supports up to 8 control units with data transfer rates of up to 1.25M bytes per second; 1 is standard on the 4331-11 and on 4361-4; 2 are standard on the 4361-5; optional on 4331-1 and 4331-2 on the 4321 or 4331-2; up to 128 unshared subchannels, plus 16 shared; 1 can be attached to any 4331 or to 4361-3; command chaining allows concurrent operation; cannot support 3830 or 3880 control units on 4331 systems; cannot mix 2311/2314/2319 DASDs on the same system with 3370/3314/7851 combinations, with 8809/4910 combinations, with magnetic tape units on the byte multiplexer channel, or with data communications line features faster than 9600 bps:

177/NA	3,340	3.00

1422 Additional Block Multiplexer Channel • 1 can be optionally attached to 4331-2 CPUs only; supports up to 8 control

 ©1984 Data Decisions

IBM 4300 Series Distributed (SSX/VSE) Computer Systems
Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

units over and above those on the 1421; functionally identical to 1421 except mutually exclusive with any 4910; 1.25M-byte-per-second data rate, except that attachment of 1431 reduces 1422 data rate to 600K bytes per second; attachment of certain devices requires 5531/5532 power interface features:

179/153	3,340	3.00

1431 High-Speed Block Multiplexer Channel (4331-2) • 1 can be attached to 4331-2 processors only; supports up to 8 high-speed control units with up to 1.86M-byte-per-second transfer rate; mutually exclusive with 1422, 3202, 4910; attachment of certain devices requires 5531/5532 power interface features:

275/NA	4,760	3.50

1431/32/33 High-Speed Block Multiplexer Channels (4361) • up to 3M-byte-per-second data-streaming channels for attaching high-speed devices like the 3380/3880 disk subsystems on 3838 array processor • data rate may be reduced due to configuration limitations such as 4361-3 data rate limited to 686M bytes per second • these channels contend nearly equally with the 3201/2/3/4 DASD/8809 Adapters for attachment to the system; the total number adds up to 1 on the 4361-3 (1 or 2 DASD/8809 Adapter or 1 BMPX and 1 DASD/8809 Adapter), 3 on the 4361-4 (2 DASD and 1 BMPX or 1 DASD and 2 BMPX), and 3 or 4 on the 4361-5 (4 DASD/0 BMPX; 2 DASD/1 BMPX; 1 DASD/2 BMPX; or 0 DASD/3 BMPX):

275/NA	4,760	3.50

3201/2/3/4 DASD/8809 Adapters • integrated adapters for attaching up to 4 strings of 3310, 3340/44, or 3370 disk drives or alternatively 8809 tape drives; up to 8 single or 4 dual drives per string yielding 32 single or 16 dual drives per adapter; drive types can be mixed on an adapter but not within a string • up to 6 drives per 8809 subsystem • the adapter transfers data at 1.86M bytes per second; it directly contends with the 1431/32/33 High-Speed Block Multiplexer Channel (BMPX) for attachment:

146/124	2,730	5.00

3202 DASD/8809 Adapter 2 • second adapter for 4361-3:

146/NA	2,730	5.00

5531 Power Interface • optional on 4331-1 and 4331-2, standard on 4331-11 and 4361 systems • provides power control for a total of 8 control units on the byte and block multiplexer channels; required for 1255, 1287, 1419, 1442-N1, 1442-N2, 1443-N1, 2415, 2501-B1, 2501-B2, 2520-B1, 2520-B2, 2520-B3, 2701, 2803, 2821-1, 2821-2, 2821-3, 2821-5, 2821-6, 2814, 3272, 3411, 3505, 3540, 3704, 3705, 3791, 3800, 3803, 3811, 3881-1, 3886-1, and 3890, all of which are available from IBM, but most are not in new production; 5531 also required for 2314-A1, 2314-B1, 2314-1, 2702, 2703, 2822, 2840, and 3895 which are no longer available from IBM; in addition, power interface features can be utilized for the 3203-5, 3274, 3340, and 3370 but are not mandatory; 1 5531 per CPU:

88/75	1,670	2.50

5532 Additional Power Interface • provides power control for 8 more control units over and above 5531 or equivalent integrated power units on 4331 or 4361-4 models; otherwise functionally identical • standard on 4361-3 and -5:

43/NA	830	2.50

I/O Attachment Limits

4321 & 4331 I/O Ceiling • individual integrated adapters can generally support all "native" I/O devices, so system limits reflect processor power to accommodate multiple fully loaded adapters • the I/O multiplexer channels can physically attach and logically address considerably more I/O activity than the power of the processor and the channel speed can support; determining system capacity for a particular type of device becomes an overall calculation of total loading from all types of adapter-attached and channel-attached controllers • for most, but not all devices, there are no special limitations so the I/O ceiling is determined by the number of controllers addressable (1024), the number of I/O channels, and the channel or adapter data rate.

4361 I/O Ceiling • the 4361 can support up to 48 subsystem control units, plus 1024 I/O units on channels; the 4361 can also attach nearly all the 4331 I/O adapters • in general, the I/O multiplexer channels on the 4361 can physically attach and logically address considerably more I/O activity than the power of the processor and the channel speed can support; determining system capacity for a particular type of device becomes an overall calculation of total loading from all types of controllers; for most but not all devices there are no special limitations so the I/O ceiling is determined by the number of controllers and devices addressable, the number of I/O channels, and the channel data rate • the number of addressable devices is not necessarily the same as the number of physical devices; a disk actuator is a logical device, so each single 3380 disk unit is counted as 4 logical devices • the number of devices attachable is also limited by the operating system interaction with the channels, in which device addresses and control buffers can also limit attachability.

I/O Devices With Defined System Limits:

1255 MICR • 1 per system.

3881 OCR • 8 per system.

3886 OCR • 8 per system.

2835/2305 Fixed Disks • 2 per channel.

3310 Disks • 16 drives per system.

5424 MFCU • 1 per system.

8809 Tape • 6 drives per system.

Communications Interface Limits:

6001 Adapter • 8 lines, 1 per system.

Loop Adapter Subsystem • 2 loop adapters; 2 data link adapters with up to 4 loops each; maximum of 80 terminals.

2701 Data Adapter • 4 lines, 1 per channel.

3704 Communications Processor • 32 lines, in EP mode, 1 per channel.

3705 Communications Processor • 352 lines.

Controllers Requiring More Than 2 I/O Subchannels:

2841 Controller • 3 or 4 subchannels when 2540 combined with 1403 in mixed subsystems.

3258 Control Unit • 8 subchannels per 3250 system.

3272 Control Unit • 32 subchannels per 3270 system.

3274 Control Unit • 32 subchannels per 3270 system.

2305 Disk • 8 subchannels per drive.

3830 Storage Control • 8 subchannels per string; 32 per subsystem; 64 if 3444s present.

3800 Storage Control • 64 subchannels per 3880; 32 per storage Director.

3838 Array Processor • 8 subchannels per 3838.

7770 Audio Response • 31 subchannels on 4331, 44 subchannels on 4341; 1 7770 per channel.

2826 Paper Tape Controller • 4 subchannels per subsystem.

☐ Communications

Communications equipment can logically and physically interface to the 4331 and 4361 processors by means of a 3704, 3705, or 3725 front end or a 2701 data adapter, but the more likely (practical) interface for any 4321, 4331, and 4361 system is by lower-cost integrated 8-line communications adapters; the 1601 integrated adapter supports a wide range of local or remote peripherals, and is supported by the ACF/VTAME access method which combines ACF/VTAM and NCP/VS features. The SSX/VSE 1.3.0 (with ACF/VTAM 2.1.0) is the first SSX operating system to support the 3705-II amd 3705-80 in NCP mode. It does not support the IBM 3725. The 4830 and 4831 local loop adapters and the 1 or 2 4840 data link adapters for remote loops on the 4331-2 and 4361 all focus on a smaller set of terminals, some of which must uniquely attach only through a loop.

 ©1984 Data Decisions

IBM 4300 Series Distributed (SSX/VSE) Computer Systems
Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

An important recent addition to IBM communications capability is the addition of X.21 and X.25 compatibility. This is supported in full by means of the 37XX front ends; on the 4331 and 4361 an X.21 interface is also supplied for the 1601 communications adapter.

4321, 4331 & 4361 Integrated Communication Subsystem

The 1601 adapter interfaces to an unswitched network with possible switched network backup; interfaces are chosen from several speeds of integrated modems, a digital service adapter, an auto-call interface, and a local attachment interface.

SDLC/BSC Terminals • include 3271, 3274, 3275, 3276, 3631, 3632, 3651, 3661, 3784, 3771, 3773, 3774, 3776, 3777, as well as 3705, 3725, 4331, S/32, S/34, S/36, S/1, S/370, 5150 PC; 6580 Display Writer, and 8100 systems.

SDLC-Only Terminals • include 3600, 4700, 3775, 3791, and the S/38.

BSC-Only Terminals • include 2715, 3735, 3741, 3747, 2701, 3704, S/3.

S/S-Only Terminals • include 2740, 2741, 5100, 5110, and the S/7 system.

1601 Communications Adapter Base • for 4321, 4331, and 4361 models • attaches up to 8 lines with SDLC, BSC, S/S transmission protocols; originally 1 or 2 protocols had to be selected out of the possible 3, but in February 1981 support was extended to all 3 operating concurrently in a DOS/VSE environment; can run both ACF/VTAME and BTAM-ES; installed machines can be upgraded through an engineering change • SDLC is supported only by ACF/VTAME running under DOS/VSE or under VM/370 R.6 or higher with DOS/VSE; maximum data rate up to 9600 bps for all lines except the first, which can be a higher-speed synchronous line provided the aggregate is less than 64K bps; each line reduces the number of byte multiplexer channel subchannels available; requires 1001 on 4321 and 4331 if more than 3 features attached; 1 1601 per CPU:

$123/NA mo	$2,330 prch	$3.00 maint

1020 Autocall Unit Interface • attaches non-IBM EIA RS-366- or CCITT V.25-compatible auto-call equipment; mutually exclusive with 4720, any nonswitched lines or 1200-bps integrated modems; each 1020 requires 1601; 3701; 2 1020s maximum per CPU:

15/NA	330	3.50

1001 Adapter Power Prerequisite • provides the extra power and control needed when more than 3 line features are attached to the 1601 Adapter:

96/NA	1,815	9.50

3701 EIA/CCITT Interface • attaches 1 EIA RS-232C- or CCITT V.24-/V.28-compatible modem; used in conjunction with 4695 or 4696; also each 3701 requires a 1601; up to 8 3701s per CPU:

15/NA	330	3.50

4695 Line Attachment Base for Clocked Modems • provides the base for line adapters attaching to EIA RS-232C-, CCITT V.24/V.28/V.35-, or X.21 BIS-compatible clocked modems; 1 4695 required for each line on 4361:

15/NA	330	2.00

4696 Line Attachment Base for Nonclocked Modems • provides the base for line adapters attaching to unclocked modems; up to 1200 bps for S/S, and up to 600 bps for BSC or SDLC; clock speed is wired to 1200 bps for BSC or SDLC and for 134.5 bps for S/S; 1 4696 required for each line:

19/NA	390	2.00

4717 High-Speed Digital Interface • provides for attachment of wideband external modem; 1 nonswitched point-to-point BSC or SDLC line can operate at 19.2K to 56K bps; always installed in position 1; no other line higher than 9600 bps can be installed:

118/NA	2,050	6.00

4720 High-Speed Modem Adapter • attaches an external clocked CCITT V.35-compatible modem; allows 1 nonswitched, point-to-point line; BSC or SDLC protocol; data rate 19.2K to 56K bps; mutually exclusive with 2311/2314/2319 on 1421, or with a 5650/9444 combination; requires 1601, 4695; 1 4720 per CPU:

45/NA	1,000	3.50

4781 1200-bps Integrated Nonswitched Modem • supports 1 nonswitched line; BSC, SDLC, S/S protocol; 1200-bps data rate; 2- or 4-wire; requires 1601, 4696; 8 per CPU maximum:

25/NA	505	5.00

4782 1200-bps Integrated Switched Modem With Auto-Answer • supports 1 switched line cable-attached to CBS or FCC registered DAA; S/S at 300 bps; BSC or SDLC at 600 or 1200 bps; requires 1601; 4696; 8 per CPU maximum:

34/NA	650	5.00

4787 1200-bps Integrated Nonswitched Modem With Switched Network Backup & Manual Answer • supports 1 switched line; BSC, S/S or SDLC transmission at up to 1200 bps; 2- or 4-wire; requires 1601; 4696; 8 4787s per CPU maximum:

35/NA	690	5.00

4788 1200-bps Integrated Nonswitched Modem With Switched Network Backup & Auto-Answer • supports 1 switched line; BSC, S/S, or SDLC transmission at up to 1200 bps; cabling provides for attachment to CBS- or FCC-type DAA for auto-answer; requires 1601, 4696; 8 4788s per CPU maximum:

39/NA	765	5.50

4801 Local Attachment Interface • attaches 1 BSC or SDLC local terminal via cable up to 800 meters long; maximum speed is distance dependent, ranging from 1200 bps at 800 meters to 9600 bps at 100 meters; 4801 includes clock for communications adapter and terminal; terminal must have external modem cable, an EIA RS-232C or CCITT V.24/V.28 interface; requires 1601, 4695; 8 4801s per CPU maximum:

39/NA	830	4.50

5650 Digital Data Service Adapter • supports 1 BSC or SDLC line with internal DDS Adapter for AT&T private line network via channel service unit; data rates of 2400, 4800, 9600, and 56,000 bps; requires 1601, 4695; when combined with 9444 (56K baud), mutually exclusive with 4720 or 231X DASD on 1421; 8 5650s per CPU maximum:

32/NA	750	4.00

5655 X.21 Adapter • for nonswitched networks:

29/NA	770	2.50

4321, 4331 & 4361 Integrated Loop & Data Link Subsystems (LANs)

The 4830 and 4831 loop adapters and the 4840 data link for the 4321, 4331 and 4361 attach a common set of local or remote peripherals to loops that can be up to 2 miles long and, in fact, constitute a type of Local Area Network (LAN). Two dual loops and 2 data link adapters can be attached. The loop adapters control local loops; the data link adapters communicate with up to 4 3843 loop control units, each controlling a single local loop; SDLC terminals controlled by the loops include the 3640 series (3641, 3642, 3643, 3544, 3645, 3646, 3647) of plant communications devices, the 3600 finance communications system (3601, 3602 controllers and their peripherals), the 8775 display, the 3287-1 and 3287-2 printers, and the 3274-51C and 3276-11 to -14 Display Control units which support 3278 and 3279 displays, and 3262, 3287, and 1 3289 printers.

The following prices apply to 4331 systems; 4361 attachments are RPQ.

4830 Loop Adapter 1 • provides for loop attachment with 1 or 2 customer-supplied physical lobe cables with a length of up to 3,200 meters (2 wire-miles) for 9.6K-bps speed or 2,000 meters (1.25 wire-miles) for 38.4K bps • compatible peripherals can attach to a 9.6K-bps loop, but only 8775, 3287, and 3274-51C models can operate at 38.4K bps • mutually exclusive with 3901 (5424 Adapter) • requires 1001:

$524/NA mo	$8,065 prch	$48.50 maint

4831 Loop Adapter 2 • requires 4830; otherwise same as 4830:

98/NA	1,630	25.00

 ©1984 Data Decisions

IBM 4300 Series Distributed (SSX/VSE) Computer Systems
Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

4840 Data Link Adapter • allows 4331 or 4361 to transmit over nonswitched lines to 1 to 4 remote 3843 loop control units; includes provisions for an external modem, 2400, 4800, or 9600 bps; point-to-point or multipoint network • mutually exclusive with 3901; requires 4830:

61/NA	**1,000**	**11.50**

3843 Loop Control Unit • supports the same set of peripherals as the 4830/4831 loop local to the CPU, but at a remote location; the 3843 controls a 9.6K-bps loop that can be up to 2 wire-miles long • provides an EIA interface to attach an external 3863 or 3872 modem for 2400-bps data rates, a 3864 or 3874 modem for 4800-bps data rates, or a 3865 modem for 9600-bps data rates (see External Modems); point-to-point or multipoint network; nonswitched lines:

210/179	**5,625**	**25.50**

3705 Data Communication Processors

The 3705 Communications Controllers are programmable dual-mode front-end processors designed for 270X compatibility in EP/VS operating mode and for development of SNA network architecture in NCP/VS operating mode. The 3705 models vary in lines handled, memory capacity, and interfacing. The EP/VS software is not supported by SSX/VSE. Under NCP software, separate subchannels are not required for each line, allowing implementation of all 352 lines. Processors are highly modular and attach to a separately priced communications scanner, which must have a separately priced attachment base for the line interface bases which attach to the line sets; modems can be integrated or external. See 950-I048-3705 for full report on 3765-II and 3705-80.

3705-80 • actively marketed and in new production • 3 submodels handle 4/10/16 full- or half-duplex lines with an EIA RS-232C/CCITT V.24 interface; includes 256K bytes of memory • entry-level models support remote operation under ACF/NCP/VS with the Remote Program Loader feature • CCITT V.35 or wideband interface options • can support X.21 and X.25 interfaces.

3705-II • actively marketed and in new production • handles up to 352 half-duplex lines; includes up to 512K bytes of MOS memory • typically interfaces to unshared subchannels on a block multiplexer channel.

NCP/VS Terminals • S/S terminals include 1050 data collection systems, 2548, 2740/2741, 3101 (2140 mode), 3767 (2140 mode) terminals; 5100 and 5110 systems (as 2741s), S/7 (as 2740), CMCT, and 1750 (in S/3 mode) • BSC terminals include 3735, 2770 (2772 controller), 2780, 2790 (2792 mode controller), 3270 (3271, 3274, 3275, 3276 controllers, 3650 (3651) data collection systems, a 3661 controller as an S/3, the 3670, 3684 systems, the 3770 controllers (3771, 3773, 3774, 3775, 3776, 3777, all as 2772/3780 except for 3777-2 as a S/360-20), and the 51XX Personal Computers • BSC systems include S/1, S/3, S/7, S/32, S/34, S/360, S/370, 8100 (1826), 1130 (1131), and 5285 and 5288 as 2772 • specific BSC terminals/systems not supported include 3651-25/75, 3670, and 5285/86 • SDLC terminals are actively supported only on NCP/VS running on 3705-II processors; those include 3271, 3274, 3275, 3276, 3631, 3632, 3601, 3602, 3614, 3624, 3651-50, 3651-60, 3771, 3774, 3791, 4700, 5285/5288, 8100, S/32, S/34, S/38.

External Modems

IBM currently markets 3 external modems that can be used on most terminals and multiplexers instead of the integrated line adapters.

3863 Modem • 2400 bps with 1200-bps half-speed backup and automatic remote speed selection.

3864 Modem • 4800 bps with 2400-bps half-speed backup and automatic remote speed selection.

3865 Modem • 9600 bps with 4800-bps half-speed backup and automatic remote speed selection.

☐ Disk

The IBM 4300 series supports 3830 and 3880 Storage Control units; 3310, 3330/3333, 3340/3344, 3350, 3375, and 3380 Disk Storage or Direct Access Storage units; and the 3850 Mass Storage Facility. All disks attached to the 4300 processors are unsectored, except the 3310 and the 3370, and are designed for variable-length records which IBM calls "Count Key Data" (CKD) architecture. The 3310 and 3370 sectored disks are called "Fixed Block" architecture. The disk-like 3850 Mass Storage Facility employs tape cartridge modules, and may be configured with other 4300 series disk units into massive automatic storage subsystems.

All disk systems attach to the 4300 series by means of either the integrated DASD adapters especially for 4321 or 4331 models or by a channel-attached disk controller that in turn attaches groups of drives that are organized into strings composed of 1 master drive with string control logic, and 3 slave drives of similar but not necessarily identical architecture. The 3830 and 3880 controllers attach multiple strings. They can usually accept certain mixtures of string types (with certain restrictions), but different drive types cannot be mixed within a string, so the subsystem organization revolves around string definition. CPU attachment parameters associated with string controllers or equivalent adapters are particularly affected by definition of an "addressable device" which is the actuator, or moving head on the drive, rather than the physical unit in all cases except the 3344 (and the 3350 operating in 3330 mode). Specifications on average access always include average latency plus positioning; occasionally IBM quotes average access as meaning positioning (seek) only.

Disk Controllers & Integrated Adapters for Strings

DASD Adapter • standard on 4321 and 4331-11; supports up to 4 strings of 3310 DASD on 4321; supports up to 4 strings of 3310, 370, and 3340/3344 DASD on 4331-11; different strings can be intermixed on an adapter, but different drive types cannot be mixed on a string; a maximum of 4 3310 strings, 4 3370 strings, and 2 3340/3344 strings attach to the 3201; maximum drives/string are 4 per 3310 or 3370, and 8 per 3340/3344 string; switching with another CPU is supported; see also 1421 block multiplexer for 3340/3370 configuration restrictions.

7851 3340/3344 Direct Attachment • allows 1 or 2 3340-A2 strings (up to 16 drives) to attach to a 4331-11; standard feature on 4331-11; the 5746-AM3 VSE/IBM S/3-3340 Data Import Software Utility allows direct reading (but not writing) of 3348 Data Modules from a S/3; limited string switching support with strings assigned to 1 processor at a time; 7851 is mutually exclusive with 2311/2314/2319 on a 1421; activation of this feature significantly impacts system performance • no charge.

Disk Drive Strings

3310 Direct Access Storage Strings • all models in limited new production as of August 1981 • provide 64M bytes of nonremovable storage per drive; single and dual master "A" drives; single drive 3310-A1 expansion to 2 drives is not by attaching a slave but is treated as model upgrade to 3310-A2; 3310-A2 master can attach 1 or 2 more drives, i.e., 3310-B1 single slave drive or 3310-B2 slave for a total of 4 drives (2 dual units) • fixed block drive architecture; 36.6-millisecond average access, 1M-byte-per-second transfer rate • up to 4 strings attach to a DASD adapter on a 4321 or 4331.

3310-A1 Disk Storage & Control • single drive master unit:

$542/$462 mo	**$6,960 prch**	**$62.00 maint**

3310-A2 Disk Storage & Control • dual drive master unit:

899/766	**11,570**	**100.00**

3310-B1 Disk Storage • single drive slave; attaches to 3310-A2:

428/364	**5,510**	**57.00**

3310-B2 Disk Storage • single drive slave; attaches to 3310-A2:

785/668	**10,120**	**95.00**

Upgrade • A1 to A2 or B1 to B2:

NA/NA	**7,090**	**NA**

3340/3344 Disk Storage Subsystem Strings • provides 34.9M, 69.8M or 279.6M bytes on each drive depending on the drive model and the data module used (if any); single or dual drive units with 1 actuator per drive; 3340 but not 3344 data is

 ©**1984 Data Decisions**

IBM 4300 Series Distributed (SSX/VSE) Computer Systems
Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

stored on removable 3348 data modules with sealed-in access arms; 3348-35 stores 35M bytes, 3348-70 stores 70M bytes • average access is 35.1 millisecond, 885K-byte-per-second transfer rate • 3344F models store 279.6M bytes and also provide an additional 1M bytes of fixed disk storage; up to 3 3340 or 3344 slave drives can be attached in any combination to a 3340 master unit • 3344 drives are 8 logical 3340 drives each, so only 2 strings with 3344s can attach to 3830-2 controllers • not supported by SSX/VSE.

3340-A2 Storage Drives & Controls • dual master drives; use removable 3348 model 35 data module which stores 34.9M bytes, or 3348 model 70 which stores 69.8M bytes:

1,745/1,485	8,600	116.00

3340-B1 Storage Drive • single slave for 3340-A2:

981/835	4,730	62.00

3340-B2 Storage Drive • dual slave for 3340-A2:

1,234/1,050	6,020	100.00

3344-B2 Storage Drive • dual slave for 3340-A2, but is a fixed storage device with a capacity of 279.6M bytes; same access and transfer rates as 3340; not in new production as of July 1981:

1,569/1,335	14,820	115.00

3344-B2F Storage Drive • dual slave for 3340-A2 like the 3344-B1 except also supplies 1M bytes of additional storage accessed by fixed-head actuators with no seek time and an average rotational delay of 10.1 milliseconds; not in new production as of July 1981:

2,050/1,745	19,460	161.00

4301 Fixed Head Feature • required to operate the 3348-70F, which has fixed-head actuators; for 3340-A2 or 3340-B2:

73/62	1,165	2.50

4302 Fixed Head Feature • same as 4301 but for 3340-B1:

37/31	583	2.00

6201 Rotational Position Sensing • provides channel disconnect during latency for 3340-B1; not supported on 7851 Direct Attachment on the 4331:

29/25	467	1.50

8150 String Switch • attaches 3340-A2 to a second storage director or DASD adapter on the same or different channels on the same or different processors:

348/296	4,915	15.00

3370 Direct Access Storage Strings • provide 571.2M (A1/729:8 (A2) bytes of nonremovable storage/drive; single drive with 2 actuators; 30.1-millisecond average access; 1.9M-byte-per-second transfer rate; string of 1 master and up to 3 slave drives can attach to standard adapters.

3370-A1 Disk Storage & Control • single master unit:

1,463/1,245	35,480	138.00

3370-B1 Disk Storage • single slave drive for A1:

1,096/933	26,600	103.50

8150 String Switch • attaches A1 unit to a second storage director or DASD adapter on the same or different channels on the same or different processors:

157/134	3,830	1.50

3370-A2 Disk Storage & Control • single disk drive storage with 2 actuators and control for attachment to 4361; provides logic for attachment of up to 3 3370 Model B1 or B2 units intermixed:

1,900/NA	35,480	126.00

3370-B2 Disk Storage • single slave drive that can attach to 3370 A1 or A2:

1,425/NA	26,600	94.50

Diskette Equipment

In addition to the integrated diskette unit, the 3540 can be attached to the byte or block multiplexer channel.

3540 Diskette • 242K-byte capacity/diskette, integrated control unit, channel-attached on 4331 automatic feed, 21-diskette hopper and stacker; double 128-byte buffers on each drive.

3540-B1 • single drive unit:

$1,181/$1,005 mo	$27,520 prch	$85.00 maint

3540-B2 • dual drive unit:

1,763/1,500	41,910	117.00

☐ Tape

The 8809 streaming tape drive attaches to models 4321, 4331, or 4361 by means of an integrated adapter. The 3410/11, 3430, and 3420/3803 tape subsystems attach to all 4300 series CPUs by means of channels. The latter sets of multiple-drive subsystems require selector mode on block multiplexer channels or burst mode on byte multiplexer channels; the controlling 3803 unit or 3410/11/3430 Master Drive require a channel control unit position on the channel. (See the 3816 Switching Unit in the Other Peripherals section for information on cross-connecting control units).

3410/3411 Magnetic Tape Subsystem

The 3410/3411 tape subsystems are clusters of 4 or 6 drives, with 2 master drive attaching 3 or 5 radially attached slaves. The low-speed 3410-1/3411-1 subsystem is a 4-drive subsystem; 3410-2/3411-2 and 3410-3/3411-3 subsystems are higher-speed, 6-drive configurations.

Tape drive Model 3420-3 production status was changed to "not in new production" in December 1981. Models 8809-2 and 8809-3 status was changed to limited new production in October 1981.

3411-1 Magnetic Tape Unit & Control • master drive with control and power for 3 more 3410-1 slaves; 9-track, 1600-bpi, PE tape is standard; options permit handling of 9-track, 800-bpi and 7-track 200/556/800-bpi NRZI tapes; 12.5-ips tape speed, 20K bytes per second for PE tapes:

$677/$569 mo	$7,910 prch	$178.00 maint

3410-1 Magnetic Tape Unit • slave drive for 3411-1 with matching functional characteristics; can also attach to 3881-2, 3886-2 OCR:

304/255	3,365	115.00

3411-2 Magnetic Tape Unit & Control • master drive with control and power for 5 more 3310-2 slaves; 25-ips speed, 40K-byte-per-second transfer rate for PE tapes, otherwise same as 3411-1:

861/723	9,910	191.00

3410-2 Magnetic Tape Unit • slave drive for 3411-2 Magnetic Tape Unit and for 3411-2 with matching functional characteristics:

404/339	4,365	127.00

3411-3 Magnetic Tape Unit & Control • master drive for 5 more drives like 3411-2, but with 3310-3 as slave; 50-ips tape speed, 80K-byte-per-second transfer rate; can also be directly attached to 3800 Printer, 3776-3, 3776-4, 3777-3, or 3790 terminals:

1,045/878	11,910	202.00

3410-3 Magnetic Tape Unit • slave drive for 3411-3 with matching functional characteristics:

509/427	5,365	140.00

3211 Single Density • for 1600-bpi operation only:

88/74	1,140	15.00

3221 Dual Density • for 60th 1600-bpi PE and 500-bpi NRZI operation; requires 9150 on 3411, requires 3550 on 3881, requires 6485 on 3886; mutually exclusive with 3211 or 6550:

130/109	2,185	53.50

6550 7-Track • converts 3410/3411 to 7-track 200/556/800-bpi only; mutually exclusive with 3211, 3221; not on 3776-3, 3776-4, or 3777-3; requires 9160 on 3411:

130/109	2,185	30.50

7360 S/370 Attachment • also for 3031, 4300, and 3800;

©1984 Data Decisions

IBM 4300 Series Distributed (SSX/VSE) Computer Systems
Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

mutually exclusive with 7003 and 7361; not for 370/115 or 370/125:

243/204	1,950	37.00

Upgrade • 3410-1 to 3410-2:

NA/NA	1,975	NA

Upgrade • 3410-1 to 3410-3, 3410-2 to 3410-3:

NA/NA	3,825	NA

Upgrade • 3411-1 to 3411-2:

NA/NA	3,415	NA

Upgrade • 3411-1 to 3411-3, 3411-2 to 3411-3:

NA/NA	7,000	NA

3420/3803 Magnetic Tape Subsystem

The 3420/3803 subsystems are clusters of up to 8 drives radially attached to a single controller. Multiple-controller tape switching arrangements enable up to 16 drives to be interconnected with up to 4 controllers. Individual drives can handle only 1 of several standard formats which do not include 7-track and 9-track mixed on a single drive, although several drive types can be mixed on a controller.

3420 Model 4 Magnetic Tape Unit • 75-ips mag tape drive with auto-threading and cartridge loading feature; up to 470K bytes per second, 6250-bpi GCR • requires comparable 3803 Model 2 controller and tape formatting function features 6420 or 6425:

$848/$712 mo	$15,340 prch	$212.00 maint

3420 Model 5 Magnetic Tape Unit • 125-ips mag tape drive with auto-threading and cartridge loading feature; up to 200K bytes per second with 1600-bpi PE • requires comparable 3803 controller and tape formatting function features 3550, 6407 or 6631:

817/686	16,000	232.00

3420 Model 7 Magnetic Tape Unit • 200-ips mag tape drive with auto-threading and cartridge loading feature; up to 320K bytes per second with 1600-bpi PE • requires comparable 3803 controller and tape formatting function features 3550, 6407, or 6631:

968/813	17,920	278.00

3420 Model 8 Magnetic Tape Unit • 200-ips mag tape drive with auto-threading and cartridge loading feature; up to 1.2M bytes per second, with 6250-bpi GCR • requires comparable 3803 Model 2 controller and tape formatting function features 6420 or 6425:

1,160/974	19,880	342.00

3550 Dual Density Feature • 800-/1600-bpi 9-track format function for 3420 Model 3, 5, 7 tape drives:

184/154	3,705	106.00

6407 7-Track Feature • 556-/800-bpi 7-track format function for 3420 Model 3, 5, 7 tape drives:

141/118	2,870	92.00

6420 Single Density Feature • 6250-bpi 9-track format function for 3420 Model 4 tape drives:

83/70	1,600	64.00

6425 Dual Density Feature • 1600-/6250-bpi 9-track format function for 3420 Model 4 tape drives:

120/101	2,205	84.50

6631 Single Density Feature • 1600-bpi 9-track format function for 3420 Model 3, 5, 7 tape drives:

141/118	2,870	63.50

Upgrade • from 3 to 4, 5 to 4, 7 to 4:

NA/NA	6,660	NA

3803 Model 2 Tape Control Unit • control unit for 3420 Model 3, 4, 5, and 7 tape drives • 1600-/6250-bpi capability • supports comparable tape drives, and requires controller formatting function features 5310 or 6320:

1,535/1,289	27,550	186.00

5310 9-Track Feature • 800-/1600-bpi 9-track format function • mutually exclusive with 6320; requires 3550 on 3420; Model 3, 5, 7 tape drives:

148/124	3,080	2.00

6320 7-Track Feature • 556-/800-bpi 7-track format function; mutually exclusive with 5310; requires 6407 on 3420; for Model 3, 5, 7 tape drives:

74/62	1,515	2.00

Switching Options

8100 2-Channel Switch • provides alternate path switching arrangement for 3420/3803 tape subsystem to the same or different host processors:

$228/$192 mo	$4,600 prch	$6.50 maint

1792 Tape Switching • 2-controller switch for switching up to 8 drives between 2 controllers; can switch 16 drives provided 2 1793s are installed in the subsystem:

307/258	6,130	13.50

1793 Tape Switching • 3-controller switch for switching up to 8 drives among 3 controllers; can switch 16 drives provided 2 1792s are installed in the subsystem:

398/334	7,820	21.50

1794 Tape Switching • 4-controller switch for switching up to 8 drives among 4 controllers; can switch 16 drives provided 2 1794s are installed in the subsystem:

466/391	9,195	21.50

8809 Magnetic Tape Subsystem

8809 subsystems are a single daisy-chained string of master and slave drives, attached to a dedicated adapter on 4231 or 4331. See the Disk section for how the 8809 conflicts with 231X attachment on the 4331-1.

8809 Magnetic Tape Unit Adapter • supports 1 8809-1A, which in turn can attach up to 5 8809-2 and 8809-3 drives; optional feature which is mutually exclusive with 3950, 1422, 1431 processor features on 4331-1; standard on 4321 and 4331-11.

4910 8809 Adapter Feature • for 4331-2:

$118/$100 mo	$3,215 prch	$3.50 maint

8809 Magnetic Tape Drives • used primarily for backup in streaming mode, but can be used for normal program data storage in start/stop mode • 20,000 bytes per second (12.5 ips) in start/stop mode; 160,000 bytes per second (100 ips) in streaming mode • 1 string of up to 6 daisy-chained drives contains 3 types; the 8809-1A master contains power and control logic for one 8809-2 slave plus string control logic; the 8809-3 master also contains power and logic for 1 additional slave 8809-2 but not for total string control, so a 6-drive configuration alternates models in a pattern of 1A, 2, 3, 2, 3, 2 • tape is 1600 bps, PE, IBM 2400/3400 compatible; interblock gap is 0.6 inches for stop/start mode and 1.2 inches for streaming mode, but this difference does not inhibit compatibility; full 200-foot reel rewind time is 2.6 minutes; streaming may have to be a dedicated operation on the 4321 or 4331 for acceptable performance; requires 4910 adapter.

8809-1A Drive • string master with up to 5 subordinate master and slave drives; always occupies position 1 on a 6-drive string:

727/461	11,960	82.50

8809-2 Drive • in limited new production as of October 1981 • slave drive attaching to either 8809-1A or 8809-3; occupies positions 2, 4, and 6 on a 6-drive string:

647/410	10,610	74.50

8809-3 Drive • in limited new production as of October 1981 • master drive attaching 8809-2 slave, occupying positions 3 and 5 on a 6-drive string:

720/461	11,960	82.50

☐ Terminals/Workstations

IBM terminals and workstations are an important part of its

 ©1984 Data Decisions

IBM 4300 Series Distributed (SSX/VSE) Computer Systems
Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

product line, and upward compatibility is as important as in CPU product lines. The large number that are compatible with 4300 series CPUs include some dating from S/360 as well as S/370. Terminals can be grouped by function and architecture into 3 broad classes: standalone units (usually displays or keyboard/printers), general-purpose terminal clusters, and special industry-oriented data collection systems. CPUs themselves can act as terminals to other CPUs or front-end processors and, like all of the above categories, can be locally attached if local interfaces and software support allow. Attachment parameters regarding both local and remote support are included in the section on Communications. Special-purpose data collection systems such as the 3600 financial systems, 3630 plant system, or 3650 retail systems are included in a separate section in Other Peripherals. This section focuses on general-purpose terminals and terminal clusters.

All 43XX systems include an integrated Display Printer Adapter (DPA) that can attach the console, terminals, terminal printers, line printers, and intelligent workstations as shown in Figure 1. The DPA can attach up to 16 local devices. On the 4361, an integrated Work Station Adapter (WSA) can also be attached. It can connect the same terminals as a local 3274 control unit or a total of 32 devices. When the WSA is installed the DPA can attach only 8 devices. Together, the WSA and DPA can attach up to 40 devices and workstations without using any additional control units.

A new Serial OEM Interface (SOEMI) is provided on the DPA and the WSA 4361. IBM states that the company intends to provide programming support for SOEMI on the 4361. A software interface for high-level languages in VSE/SP and VM/SP environments will be provided.

IBM also intends to support the Distributed Function Terminal (DFT) mode on the WSA for the 4361. The DFT mode will allow up to 4 concurrent host sessions, 8 colors, and extended highlighting and programmed symbols on the IBM 3270 PC. In addition, it will allow the attachment of 3270 PC/Graphics (PC/G) with a full set of graphics functions.

3270 series units can be configured as standalone and cluster display terminal systems employed in inquiry/update, data entry, program development, graphics, and personal computing tasks in conjunction with host processors and databases. They are used with IBM S/360, S/370, 4300, 8100, and S/3 processors and with the 3790 Communications System and the 3730 Office System, as well as directly attached to the 4300 series. Local attachment is by channel attachment, or by 3704/3705 communications channels at rates up to 650K cps on the 4341. The 4321, 4331, and 4361 models have integrated display/printer adapters and integrated communications line adapters for local and remote attachments, respectively. Directly attached 3274 control units attach to byte or block multiplexer channels with 32 subchannels and channel control unit position required. Recommended attachment of all local versions of the 3274 is to unshared DCC subchannels on the block multiplexer channel in block multiplex mode; selector mode or non-DCC channels are not recommended. Remote attachment is by nonswitched private or switched dial line communications facilities in BSC/SDLC at rates to 9600 bps. Configurations include standalone 3275, 3277, 3278, and 3279 display terminals and/or 8/12/16/32-terminal clusters (displays and/or printers). The family includes character and line printers. Also included are models that provide multicolor display and print capability.

The 3230 Keyboard Printer Terminal is the only standalone desktop bidirectional electromatrix printing terminal for the 4300 series.

The 3270, 3790, 3730, and 3770 terminal systems have been developed around displays and keyboard/printers; the 3790 includes the 3270 as well as disks and tape drives in an interactive system that can be downloaded from the host; the 3730 is a subset of the 3790 with a special word processing terminal; the 3770 is a series of keyboard printer terminals that can be upgraded into a remote batch system; 3790 and 3730 systems can be locally attached to a 4341, but the 3770 cannot.

The 6580 Displaywriter and 5520 Administrative Office System were enhanced in late 1982 with transmission capabilities that make them look like a 3270. They consequently can transmit to 4300 systems as well.

Intelligent Workstations • the IBM Displaywriter, IBM Personal Computer, and the 3270 Personal Computer Attachment are supported as intelligent workstations; attachment methods and protocols available depend on the device type and its emulation mode.

2002 Work Station Adapter (WSA) • available option for all 4361 models; provides support for the connection of the same devices as a local 3274 control unit as well OEM devices through Serial OEM Interface (SOEMI); when connected it reduces the number of ports on the DPA from 16 to 8 • provides connection for up to 32 devices through 3299-1 Terminal Multiplexers; each 3299 provides 8 ports • SOEMI implements a protocol based on structured field in microcode; designed to support a variety of devices for engineering/scientific and manufacturing environments • maximum of 1 per system:

$427/NA mo	$7,500 prch	$30.00 maint

3299-1 Terminal Multiplexer • provides 8 terminal ports; terminals can be located up to 4,000 feet (9.840 feet with coaxial cable) from 3299:

NA/NA	1,175	NA

3101 Displays

3101 Display Terminal • moderately priced ASCII terminal available in 8 models, all of which display 1920 characters in 24 lines of 80 characters each; a 25th line provides terminal status; up to 128 ASCII symbols displayed within 7x14 matrix within 9x16 field on 12-inch screen; 95-character set also available; reverse video, scrolling, blink, intensity, and protected fields standard features; transmission is half- or full-duplex, asynchronous at 110 to 9600 bps • supports 1 3102 thermal printer • see 950-I048-3101 for full report on 3101.

3270 Series Terminals & Clusters

3270s are standalone and cluster display terminal systems employed in inquiry/update, data entry, program development, graphics, and personal computing tasks in conjunction with host processors and database. They are used with IBM S/360, S/370, 3030, 3081, 8100, and S/3 processors and with 3790 Communications System, as well as with 4300s. Local attachment is by channel attachment, by local or remote loops, by integrated Display/Printer Adapter (DPA) or Work Station Adapter (WSA), or by communications channels at rates up to 650K cps. Remote attachment is by nonswitched private or switched dial line communications facilities in BSC/SDLC at rates to 9600 bps. Configurations include standalone display terminals and/or 8/12/16/32-terminal clusters (displays and/or printers).

The IBM 3270 Series line of terminals is extensive. See Report 950-I048-3270 for full coverage of these terminals, their cluster controllers, and attached printers.

8775 Display Terminal

8775-X • high-function terminal for local or remote communications attachment (via data link adapter not available for direct display/printer attachment or for channel attachment) • 2 models provide choice of display formats of 960/1920/2560 characters per screen (Model 11) and 960/1920/2560/3440 characters per screen (Model 12); choice of screen size is system option not operator option; displays 96 characters or 224 characters (APL) with special feature; all display lines are 80 characters wide; number of lines per screen can be 12 (for 960 characters), 24 (1920), 32 (2560), or 43 (3440) lines; a 9x16 matrix is used for screen sizes up to 2560 characters; a 9x12 matrix is used for the 3440 size; the basic terminal is essentially equivalent to a 3270 in terms of field formatting capabilities, including protect/unprotect, alphanumeric/numeric, normal-/high-intensity display, display/nondisplay, and selector pen allowed/not allowed; depending on keyboard selection, which includes data entry- and typewriter-style options, from 7 to 24 program function keys are included; Cursor Select standard feature provides "light pen" type of field selection by using cursor

 ©**1984 Data Decisions**

IBM 4300 Series Distributed (SSX/VSE) Computer Systems
Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

and special key; special features for increased capability are described below (3624 and 5110).

8775-11 • communications (local or remote) attached; 960/1920/2560-character display • requires external modem, 1200-bps integrated modem, V.35 DDS interface feature, or X.21 adapter for nonswitched networks (3701 or 5550, 1550, 5650/5651, or 5655):

$125/$107 mo	NA prch	$24.50 maint

8775-12 • communications (local or remote) attached; 960/1920/2560/3440-character display • same requirements as 8775-11:

140/120	NA	24.50

3701 External Modem Interface • RS-232C interface for transmission at 600 to 9600 bps over nonswitched facilities • also requires 1488 clock if modem does not provide clocking; can be connected locally at up to 40 feet without modem:

16/14	374	3.50

5500 Integraded Modem • 1200 bps over nonswitched lines • requires 1488 clock:

27/23	563	6.50

1550 V.35 Interface • up to 9600 bps over communications line or local connection at up to 1000 feet without modem:

21/18	561	1.50

5650 DDS Adapter • point-to-point operation for SDLC transmission over nonswitched lines at 2400, 4800, or 9600 bps:

34/29	840	1.50

5651 DDS Adapter • multipoint, tributary operation only for SDLC transmission over nonswitched lines at 2400, 4800, or 9600 bps:

33/28	840	1.50

5655 X.21 Adapter • for nonswitched networks; for attachment to DCE Data Circuit terminating equipment conforming to CCITT X.21 recommendation, for SDLC transmission at 2400, 4800, or 9600 bps:

32/27	800	1.50

1488 Clock • 600- or 1200-bps clock 5500 integrated modem or external modem:

6/5	234	1.50

4621 75-Key Typewriter • EBCDIC keyboard; 12 program function keys (alternate shift):

19/16	417	2.00

4622 75-Key Data Entry • EBCDIC keyboard; 10 program function keys:

19/16	417	3.00

4623 75-Key Data Entry • EBCDIC keyboard; key punch layout for numerics; 10 program function keys:

19/16	417	3.00

4626 87-Key APL Typewriter • APL or EBCDIC (operator selectable) keyboard; 12 program function keys • requires 3624 Enhanced Function:

23/20	569	2.50

4627 87-Key Typewriter • EBCDIC keyboard; 24 program function keys (12 are alternate shift):

23/20	569	2.50

4690 Numeric Lock • locks keyboard if nonnumeric key (other than 0-9, -, or dup) is depressed in numeric defined field:

NC/NC	NC	NC

4944 Monocase Switch • prevents display of lowercase letters; automatic mapping of keyed lowercase into equivalent uppercase • no cost option; can be field installed:

NC/NC	NC	NC

(RPG) TJ0044/45 • 3287 or 7436 slave printer attachment to 8775; RPG TJ0044 allows 1 slave printer to be attached to the 8775-1 or 8775-2; RPG TJ0045 allows 1 printer to be attached to the 8775-11 or 8775-12; printers may be 3287-1, -2, 1C, 2C, or RPQ 7436; supported by any program product that allows 3287 or 7436 to be attached to a 3274 or 3276:

40/34	1,445	5.00

3624 Enhanced Function • downline-loaded microcode which adds APL set display capability as well as highlighting, partitioning of screen, and validation options; highlighting by character is supported for blink, reverse video, and underscore in addition to the standard intensity by field; user can define up to 8 independent partitions for display and entry; partition is assigned number of lines, no horizontal partitioning; validation features include mandatory enter or fill and immediate send on completion of field; does not include scrolling capability of 5110; IDTF, 3624, and 5110 are mutually exclusive • requires 3622 and 3905 • no charge.

5110 Partitions & Scrolling • downline-loaded microcode which permits user to define up to 8 independent partitions as with 3624 but adds capability to scroll up and down independently within each partition via key; adds 58-line buffer (4640 characters) to support scrolling; IDTF, 3624, and 5110 are mutually exclusive • requires 3622 • no charge.

IDTF Interactive Display Text Facility • downline-loaded microcode from host program bearing the same name; gives operator access to distributed, text processing, storage and retrieval functions of DISOSS; designed to be used in conjunction with DPCX and DOSF on 8100 or with DISOSS on host 4300 or 30XX system; mutually exclusive with 5110 and 3624 microcode features • no charge.

3622 Feature Storage • provides control storage to support 3624, 5110, or IDTF features:

29/25	754	3.00

3905 Feature Adapter • provides logic and control for 3624:

165/143	424	2.00

6350 Selector Light Pen • provides alternate field selection capability to standard cursor select key operated capability; causes return of data and cursor address; operation is field selectable:

22/18	526	1.00

1090 Audible Alarm • sounded under program control or next to last character on screen to alert operator:

2/2	93	NC

1009 Set Up Keylock • provides key-controlled access to terminal address:

NA/NA	75	NC

6340 Security Keylock • key-controlled disabling of keyboard or program modification of displayed data:

NA/NA	40	NC

4999 Magnetic Reader Control • required for attachment of magnetic stripe reader:

16/14	364	2.00

9440 Magnetic Hand Scanner (Part Number 4123495) • used to read magnetic labels:

NA/NA	286	NC

9441 Magnetic Slot Reader (Part Number 4123500) • cable-connected device that reads information from magnetically encoded stripe on plastic cards such as credit card; accepts wide range of sizes; accepts up to 40 or 65, depending on recording density (75 or 127 bpi) of numeric digits • used primarily as operator identification; cannot be used to log terminal onto SNA network:

NA/NA	286	NC

Battery (1743456) • nonrechargeable mercury battery that provides several years of backup capability for maintaining critical control information when terminal power is off; prevents re-establishing of terminal configuration parameters at each power up:

NA/NA	17	NC

6670 Printing Terminal

IBM 6670 Series Information Distributor Printing Terminals • the 6670 and 6670 II employ micrologic under the control of

 ©1984 Data Decisions

IBM 4300 Series Distributed (SSX/VSE) Computer Systems
Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

OCL (Operator Control Language) programming to format, store, print, record, receive, or send document text or data; information is entered locally or off-line via a mag card stack reader-recorder, integral to the 6670, or remotely from an 8100, another terminal, or word processor via communications facilities; not supported by 8140C models; OCL commands and instructions interact with user-defined formats stored within the 6670 to format text or data into finished page copy; formatted information is then transferred to internal, nonremovable diskette storage, capable of handling about 100 pages of user text; subsequent text printing, card recording, or document transmission operations draw from formatted text in storage; micrologic-controlled paper handling and laser electrophotographic (xerographic-type) imaging generate dot-matrix graphics on plain paper surfaces; a document platen and optical imaging mechanism are also included on the 6670 for use in conventional office copying tasks; the major difference is that the 6670 Model II has a different microprocessor providing enhanced performance and throughput over the 6670; this allows the Model II to have 20 fonts per machine instead of 6 on the 6670, 16K-byte page buffer memory instead of 12K bytes on the 6670, 241K-byte diskette storage instead of 210K bytes on the 6670, 9600/9600-bps maximum BSC/SDLC line speeds instead of 4800/7200 bps on the 6670, and 576 printed pages first set rate per hour instead of 342 on the 6670; in addition, up to 14 fonts can be sent from the host computer to the 6670 Model II.

6670 • up to 4/6/6 fonts per page/job/machine • 12K-byte page buffer memory; 210K-byte diskette storage • BSC/SDLC line speeds from 600 to 4800/7200 bps; IBM 2770 BSC device emulation; SNA LU4 SDLC device emulation; EBCDIC/ASCII transmission • supports switched and leased lines, Digital Data Service Adapter, and auto-answer • 342/1752 printed pages first/subsequent set rates per hour using normal orientation; 162/486 using rotated (printing on 11-inch side of 8.5x11-inch page); sample printing speeds assume 4800-bps communication rate; electronic collation of prints • 7.5 seconds for first copy; 36 pages per minute for subsequent copies; optional collation for copies:

$1,640/$1,440 mo	$67,500 prch	$390.00 maint

6670 Upgrade to Model II • field upgrade feature converts 6670 to 6670 Model II:

NA/NA	5,000	NA

6670 Model II • up to 4/6/20 fonts per page/job/machine • 16K-byte page buffer memory; 241K-byte diskette storage • BSC/SDLC line speeds from 600 to 9600 bps; IBM 2770 BSC device emulation; SNA LU4 SDLC device emulation; EBCDIC/ASCII transmission • supports switched and leased lines, Digital Data Service adapter, and auto-answer • 576/1962 printed pages first/subsequent set rates per hour using normal rotation; 306/1500 printed pages first/subsequent set rates per hour using rotated output (printing on 11-inch side of 8.5x11-inch page); sample printing speeds assume 9600-bps communication rate; electronic collation of prints • 7.5 seconds for first copy; 36 pages per minute for subsequent copies; optional collator for copies:

1,810/1,590	72,500	390.00

Usage Charge • a per copy usage charge is imposed on all monthly printout or copy pages in excess of a 5000 minimum; $0.011 per copy is applied to purchase with maintenance units; $0.028 per copy to 6-month rental units; $0.025 per copy to 2-year lease units; and $0.024 per copy to 3-year lease units.

5510 Modem • integral 6670 1200-bps modem with 600-bps half-speed backup, switched line auto-answer, nonswitched line plus switched line network backup (SNUB) with auto-answer; monthly charges are rounded to nearest dollar:

18/75	665	NA

DDS Adapter • integral 6670 Digital Data Service (DDS) adapter for 2400- or 4800-bps operation over AT&T Dataphone Digital Service nonswitched networks:

24/20	840	4.40

External Modem Interface • allows use of external IBM or non-IBM modems operating at speeds up to 4800 bps via RS-232C/CCITT V.24 interface; monthly charges are rounded to nearest dollar:

17/14	250	NA

Font Storage Feature • allows online storage of additional character type fonts • font selections include 10-pitch Courier and Prestige Pica; 12-pitch Prestige Elite, Letter Gothic, and Symbol; proportional Essay Standard and Bold and Essay Italic; and 13.3-pitch Data 1 Rotated for condensed 132-column printout on 10-inch line parallel to long side of paper • up to 4 10-pitch, 12-pitch, or proportional type styles may be intermixed during printout if underscoring is not required; up to 3 styles may be intermixed during printout with 1 font underscored; up to 2 styles with underscoring may be intermixed during printout; Data 1 Rotated cannot be intermixed with other fonts:

76/67	2,000	NC

Type Font/Style Card • contains 2 fonts per card:

NA/NA	300	NC

6671 Collator & Collator Attachment • provides an additional output path for copies; cannot be used in printout operations • 20-bin collator holds up to 100 sheets of 20-lb paper per bin:

140/124	4,730	40.00

Magnetic Card Reader-Recorder • the integral mag card reader-recorder serves both as a text I/O device and as an OCL (Operator Command Language) stored format program loader • mag cards are encoded in IBM/OPD word processor compatible code, with each card holding 5000 characters in a 50-track (line) by 100-character-per-track format • reader-recorder holds stack of 50 mag cards; reads at a rate of up to 240 cps and records at a rate of up to 200 cps; no charge.

3622 Feature Storage • provides control storage to support 3624, 5110, or IDTF:

25/21	824	3.50

3905 Feature Adapter • provides logic and control for 3624:

14/12	463	2.00

6350 Selector Light Pen • provides alternate field selection capability to standard cursor select key-operated capability; causes return of data and cursor address; operation is field selectable:

19/16	638	1.00

1090 Audible Alarm • sounded under program control or on next-to-last character on screen to alert operator:

2/2	102	NC

1009 Set Up Keylock • provides key-controlled access to terminal address:

NA/NA	69	NC

6340 Keylock • key-controlled disabling of keyboard or program modification of displayed data:

NA/NA	37	NC

4999 Magnetic Reader Control • required for attachment of magnetic stripe reader:

14/12	442	2.50

9440 Magnetic Hand Scanner (Part Number 4123495) • used to read magnetic labels:

NA/NA	286	NC

9441 Magnetic Slot Reader (Part Number 4123500) • cable-connected device that reads information from magnetically encoded stripe on plastic cards, such as credit card; accepts wide range of sizes; accepts up to 40 or 65, depending on recording density (75 or 127 bpi) numeric digits • used primarily as operator identification; cannot be used to log terminal onto SNA network:

NA/NA	286	NC

3770 Series Remote Batch/RJE Terminals

The IBM 3770 Series is a family of batch/RJE terminals which operate in online and off-line modes. In all, 13 distinct models are offered, some of which support online interactive and/or off-line batch operations. Communications with the host is under BSC and SDLC control. The programmable terminal configurations are

 ©1984 Data Decisions

IBM 4300 Series Distributed (SSX/VSE) Computer Systems
Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

still firmware fixed as to function. Only 22K bytes of memory are provided on programmable models to handle all application programs and services; and all programming must be done in assembler language and macros, and compiled on the host.

The IBM 3770 Series of Data Communications Systems is extensive. See Report 950-I048-3770 for full coverage of these devices.

Other Multipurpose Data Entry Terminal Clusters

3790/8100, 3730, and 3770 terminal systems have been developed around displays and printers; the 3790, or its successor, the 8100, includes the 3270 as well as disks and tape drives in an interactive system that can be downloaded from the host; the 3730 is a subset of the 3790/8100 with a special word processing terminal; the 3770 is a series of keyboard printer terminals that can be upgraded into a remote batch system; 3790 and 3730 systems can be locally attached to a 4331 but the 3770 cannot.

3790 System • the 3790 is a multipurpose remote data entry system with strong orientation toward interactive processing but with provisions for batch as well • it can be locally attached to a byte or block multiplexer channel, a 3704/3705 or a 4331 communications adapter, or transmit at 1200 bps to a remote 3704 or 3705 using SDLC or BSC • software is downloaded from the host • the 3791 can attach 4 to 16 keyboard printers, or up to 31 displays plus 4 keyboard printers • additional attachable peripherals include 155-lpm, 410-lpm line printers, magnetic tape and the entire complement of 3200 Series peripherals attaching to the 3276 I/O unit; 3791 disk storage ranges from 5M to 30M bytes; the system can also attach the 3762 payment transaction processor, the 3411 Magnetic Tape Unit, and remote 2741 terminals; the 3790 is downward compatible with the 8100.

3730 Office System • the 3730 is a special configuration of the 3790 which includes word processing and a special keyboard terminal, the 3732 Text Display Station, and a 3736 Printer • see Products—IBM 3730 for a full report on this system, which can attach locally or transmit from a remote location to the 4300 systems.

☐ Printers

The 3203, 3211, 3262, and 4245 Printers can be attached to 4300 series processors by means of a byte or block multiplexer channel. Line printer models 3262, 3268, and 3287 can attach to a processor unit via a display/printer adapter.

The 3203-5 has been withdrawn from marketing.

3211 Printer Subsystem

3211-1 Printer • no longer in new production • 2000 lpm with 48-character set; Universal Character set standard; 132 print positions; 10-pitch; 6- or 8-lpi spacing; forms control buffer, high-speed skip of 90 ips; powered stacker • requires 3811:

$2,793/$2,345 mo	$40,080 prch	$952.00 maint

5450 OCR Print Package • additional manual platen controls:

NA/NA	816	NC

5554 18 Additional Print Positions:

81/75	2,150	15.50

3216-1 Interchangeable Train Cartridge:

660/NA	11,600	206.00

3262 Printers

3262-1 Line Printer • 650 lpm with 48-character set; 253 lpm with 128-character set; interchangeable print bands; 132 print positions; 10-pitch; 6- or 8-lpi spacing; 288 universal character set buffer is standard:

$637/$541 mo	$15,040 prch	$193.00 maint

3262-11 Line Printer • 325 lpm with 48-character set or 125 lpm with 128-character set; otherwise same as 3262-1:

468/398	12,620	141.00

5450 OCR Feature • provides either OCR-AON or OCR-BON 48-character numeric and associated special characters:

119/101	3,990	40.00

1090 Audible Alarm • notifies operator of the need for manual intervention:

6/5	201	NC

328X Series Printers

3287 Printers • operates at 80 or 120 cps, depending on model • all models provide 132 print positions, 10 cpi, 6/8 lpi, and dual-case (upper/lower) operations; paper is 8 to 14.88 inches wide; up to 6-part forms; dot-matrix printing is accomplished bidirectionally using a 4 or 7 wide by 8 high dot matrix; all models are desktop units; Models 1C and 2C print in red, green, and blue as well as black, with standard multicolor ribbon cartridge.

3287-1 Printer • 80-cps, dot-matrix tabletop, adapter-attached printer, bidirectional printing under ideal system factors gives related speed; throughput can be impacted by single-direction printing, type of configuration, output format, CPU processing load, and attachment-line speed • 132 print positions, 10-pitch, 6- or 8-lpi spacing, 4x8 dot matrix; can print 6-part forms • attachment to 4331 requires port on the standard display/printer adapter or its 2001 extension; attachment to 4341 requires a position on the standard 4341 console; 4331 and 4341 CPU groups all require feature 8331 on the 3287:

$275/$234 mo	$4,830 prch	$37.50 maint

3287-2 Printer • 120 cps; otherwise same as 3287-1:

336/286	5,150	46.50

3287-11 Printer • 80-cps printer, attaches to local or remote loops; requires loop adapter and local loop or data link adapter and 3842 (remote) loop control unit at 3287-11 site; otherwise same as 3287-1:

319/272	4,995	41.50

3287-12 Printer • 120 cps; otherwise same as 3287-11:

381/324	5,315	50.00

3287-1C • 80 cps; color printing; attaches to 3251C or 3276 control unit:

340/290	5,210	42.50

3287-2C • 120 cps; color printing; attaches to 3251C or 3276 control unit:

400/340	5,530	51.50

1120 • APL text capability feature:

6/5	165	0.50

3610 • extended character set adapter:

21/18	429	3.00

5781 • programmed symbols, set PS-2:

45/39	826	4.00

5782 • programmed symbols, set PS-4:

37/32	662	2.50

5783A • programmed symbols, set PS-4A:

81/70	1,485	11.50

8331 3274/3276 Attachment • required for attaching 3287-1 or 3287-2 to 4331 as well as 3274/3276; provides needed buffer storage:

6/5	165	0.50

3880 Extended Print Buffer • additional buffer for 2560, 3440, or 3564 print positions on 3287-1 or 3287-2; programming considerations and adapter capabilities can impact capacity:

7/6	198	0.50

4110 Friction-Feed Paper Handling • requires nonpreprinted single-part forms:

6/5	151	0.50

8700 Variable-Width Forms Tractor • for marginally punched forms 3 to 15 inches wide; if skipping is required, this feature is advisable:

6/5	151	0.50

3289-4 Line Printer • 400 lpm with 48-character set, 300 lpm with 64-character set, 230 lpm with 94-character set, 160 lpm with 125-character Text Print EBCDIC set; belt impact printer,

 ©1984 Data Decisions

IBM 4300 Series Distributed (SSX/VSE) Computer Systems
Models 4321, 4331-2, 4331-11, 4361-3, 4361-4 & 4361-5

132 print positions, 10-pitch 6- or 8-lpi spacing, 256-byte alternating buffers, SNA character string data stream handling • 6-part forms, front forms loading, vertical forms control, paper jam detection; variable-width tractor for up to 15-inch forms • see dot chart for attachment and production status:

868/739	**13,140**	**161.00**

1090 Audible Alarm • for 3289-4:

6/5	**192**	**NC**

4650 Keylock • for 3289-4:

NA/NA	**37**	**NC**

5210-G1 Printer • 40-cps letter-quality printer with multiple 96-character printwheel options:

NA/NA	**5,420**	**54.00**

5210-G2 Printer • 60-cps letter-quality printer with multiple 96-character printwheel options:

NA/NA	**5,835**	**58.50**

IBM 4245 Line Printer Model 1 • 2000-lpm model using 48-character set; provides fully formed character band printing technology similar to 3262; 132 print positions, 10 characters per inch, 6/8 lines per inch • attaches to 4300 through byte or block multiplexer channel; first delivery July 1983:

3,750/NA	**63,500**	**650.00**

☐ MICR/OCR Equipment

IBM's MICR and OCR equipment can also attach to the byte or block multiplexer channel.

• END

©1984 Data Decisions

IBM 5250 Information Display System
Models 3180, 5251, 5291, 5292 & 5294

■ PROFILE

Function • interactive display terminal system used in standalone, chain, or cluster configurations for inquiry/update, data entry, record building and other tasks in conjunction with host processor or database • local processing via 5150 or 5160 personal computer attachment • used with IBM S/34, S/36, S/38, and Series/1 processors.

Architectures Supported • 5251 Models 11 and 999 and Models 5291 and 5292 display stations, plus IBM 5150 and 5160 personal computers attach locally to S/34, S/36, S/38, and Series 1 processors • remote attachment of these peripherals via 5251 Model 12 and/or Model 5294 Remote Control Unit to S/34, S/36, and S/38 • local connection via I/O ports; remote via communication adapters • point-to-point and multipoint configurations • SNA/SDLC protocol.

Communications • single line, point-to-point, or multipoint • rates up to 9600 bps on dedicated (nonswitched) lines; 4800 bps on switched lines; half-duplex • Model 5294 remote control unit provides DDS support to 56K bps; X.21 to 4800 bps; and X.25 to 9600 bps • SDLC/BSC; EBCDIC code.

Operating System • System Support Program (SSP) for S/34; Control Program Facility (CPF) for S/38; Real-time Programming System for Series/1.

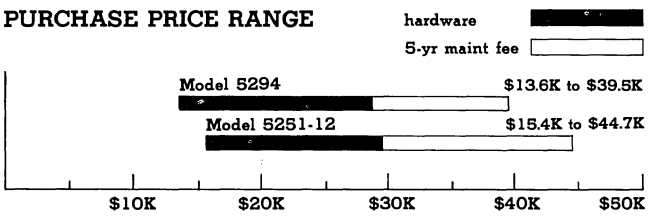
Database Management • none; only in association with host processor.

Transaction Processing Management • locally through host processor and through 5251 Model 12 and Model 5294 • distributed through host (5251 Model 12) and 5294 • supports send, receive, and inquiry tasks.

Support Software • supported by and employs facilities of host processor • no independent (from host) off-line programming or processing capabilities except with personal computer.

Processor • separate microprocessors control applications processing, keyboard/display, printer, and communications.

PURCHASE PRICE RANGE



IBM 5250 PURCHASE PRICING bar graph covers price ranges between "small" and "large" configurations for the Model 5294 Remote Control Unit and Model 5251-12 remote terminal-controller • hardware prices are shown in solid bars; associated 5-year maintenance fees are shown in open bars • **small** model 5294 consists of 5294 Remote Control Unit, 2 Model 5252-11 displays and associated keyboards, 1 Model 5219-D02 printer, and 1 forms tractor; **large** configuration consists of a 5294 plus an Extended Cluster adapter providing 4 I/O ports, 2 Model 5251-11 displays with associated keyboards, 2 Model 5291 displays with associated keyboards, a Model 5219-D02 printer, a forms tractor, and a Model 5224-M2 printer • **small** Model 5251-12 consists of a 5251 Model 12 display and associated keyboard, a Model 2550 Cluster expansion unit, 2 Model 5251-11 displays with associated keyboards, a Model 5219-D02 printer, and a forms tractor; **large** configuration consists of a 5251 Model 12 display with associated keyboard, a Model 2551 Dual Cluster expansion unit, 2 Model 5251-11 displays with associated keyboards, 2 Model 5291 displays with associated keyboards, a Model 5219-D02 printer, a forms tractor, and a Model 5224-M2.

Terminals/Workstations • up to 9 keyboard/display terminals per system.

First Delivery • 1977 to 1984 dependent on model or component.

Systems Delivered • undisclosed.

Comparable Systems • at present, emulated only by Memorex with its 2051-11 replacement for IBM 5251 Model 11 and its 2056 200-cps replacement for IBM 5256 printers.

Vendor • International Business Machines, Information Systems Group (ISG); 1133 Westchester Avenue, White Plains, NY 10604; 914-696-1900 • National Marketing Division; 4111 Northside Parkway, Atlanta, GA 30327; 404-238-2000.

Canadian Headquarters • IBM Canada Limited; Markham, 3500 Steeles Avenue East, Markham, ON L3R 2Z1 • 416-474-2111.

Distribution • worldwide via local IBM sales/service offices.

GSA Schedule • listed.

■ ANALYSIS

During late 1983 and early 1984, IBM instituted enhancements to the 5250 to make it more competitive in a changing market. The most striking change was the addition of the Models 5150 and 5160XT Personal Computer as part of the clustered terminal family. The PCs can be used in local clusters, or remotely (from host processor) attached via the 5251 Model 12 terminal-controller and/or Model 5294 Remote Controller. The 5294 (officially announced in January 1984) is a standalone cluster controller attaching up to 8 display stations, personal computers, or printers in any combination. Actually, the 5294 is an enhanced version of the controller portion of 5251 Model 12, but offers communication facilities not available with its parent. For

 ©1985 Data Decisions

IBM 5250 Information Display System
Models 3180, 5251, 5291, 5292 & 5294

example, the Model 12 supports only SNA/SDLC and transmission speeds up to 9600 bps. The 5294 provides the same facilities, but also offers options for attaching the controller to an X.21 interface or X.25 network at 4800 or 9600 bps, respectively, and to DDS at speeds up to 56K bps.

The Model 5294 could be the controller of the future for the 5250. It supports the same peripherals as the Model 12 and also implements the popular cable-thru feature that allows up to 8 terminals/printers to be daisy-chained together. With its advanced communication features and small (tabletop) packaging, it's a very attractive unit. It's also slightly less expensive than the 5251 Model 12.

The addition of personal computers to the 5250 environment began in mid-1983 when IBM announced PC support for the Systems/34/36/38, and Series/1. Users can attach a Model 5150 or 5160 directly to an I/O channel on the host processor, or can remotely attach them via the 5251 Model 12 and Model 5294 (except Series/1). In local attachment or remote modes, the PC can emulate a 5251 Model 11, 5291, or 5292 display, thus satisfying users with applications geared towards those terminals.

The addition of PC support is in keeping with IBM's strategy towards distributed processing. IBM officially legitimatized the concept on March 8, 1983 when it announced PC support for the 3270, System/34 and System/38, and further reinforced the processing facilities a few months later with the PC/XT.

IBM has discontinued a few members of its 5250 family. Gone are the 5251 Models 1 and 2 and the 5252 Dual Display Station. The discontinuence of the 5251 Models 1 and 2 is no surprise. Both are 960-character displays (12 lines x 80 characters) and are out-of-step with current industry demands. The 5252 is another product that is no longer suited for modern needs. This unit features back-to-back displays, with each displaying 960 characters.

Added to the line is the 5292 Model 2 Color Display Station. This product offers the same display facilities as the 5292 Model 1 (e.g., 7-color support and 1920-character display) but has a very good business graphics facility. In fact, its addressable points are 480x288. In addition, the Model 2 has 3 I/O ports for attaching printers, electronic film cameras, monitors, and digital plotters.

The 5250 is menu driven, eliminating the need for operators to memorize system commands or to follow formal procedures when selecting a job. The menu displays the job name followed by a code. A job is selected by entering the corresponding code followed by a password (if applicable).

To reduce the possibility of entering inappropriate data or omitting data, the 5250 provides first-class format control. For example, certain fields can be designated for alphabetic data only or alphanumeric. A mandatory enter field requires the operator to enter at least 1 character, eliminating the possibility that an important field would be overlooked during a data entry operation. To safeguard fields from inadvertent data entry, the 5250 provides a bypass feature which forces the cursor to skip a protected field.

Overall ease of operation is further enhanced by 24 programmable functions which can be assigned to user-selected keys. By invoking the program key functions, the operator is spared the burden of memorizing strings of commands required to execute certain routines.

Competitive analysis of the product versus the other offerings on the market is unrealistic with the 5250 because it competes at both the terminal and systems level. The 5251 competes with just about all interactive terminals with respect to display and format support. Attributes such as reverse video, blinking/underline fields, high intensity characters, field restrictions, and programmable function keys have become standard features in the industry. Even the new Model 5292 Color Display, with a 7-color display capability, is a good, but not spectacular, product.

As a system, the 5250 employs the concept of a local controller with slaved terminals. The controller handles all requests for services from the host and provides the communications link. Again, the 5250 is not unique. Such systems as IBM's own 5280 and 3270 (and all the look-alikes), Sperry UTS 4000, Datapoint 1800, Harris 8210/8212, Data General CS/10 and 20, etc all use the central controller concept. The key difference is that those units are targeted at larger users with more diverse processing requirements. The 5250's 8-terminal/printer upper limit and inquiry/update/data entry orientation make it useful for much smaller applications.

☐ Strengths

With the addition of personal computer handling to the established flexibility of the 5250, IBM has a very strong package with lots of appeal to small users. For example, the system's 6 display stations allow local and remote configurations of single terminals or, with the addition of cluster options on the 5251 Model 12 and Model 5294 Remote Control Unit, a multidropped system can be configured. The Model 5150 PC1 and 5160 XT have been acclaimed for their ease of use and reliability, and, of course, there is a mountain of software available for them.

The 5250 is conducive to a local environment where multiple terminals are dispersed around many different locations. Any peripheral can be located up to 5,000 feet from the host processor using twinaxial cable, or a Model 12 or Model 5294, if these terminals are used as the cluster controller. This is superior to the 50-foot limitation imposed by conventional RS-232C colocation attachment.

The cable-thru feature used to configure a local multidrop system is a strong user benefit. It gives the user the flexibility to expand a system without concern for port limitations. The feature accommodates multiple devices on a single port, eliminating the need for multiple ports.

Two other extremely attractive features are data encryption and printer data lookahead. IBM's data encryption is based on the NBS Data Encryption Standard, and functions with BSC and SDLC protocols. Data encryption is needed to transmit sensitive data and is certainly a plus for the 5250.

The lookahead feature, implemented by both printers, accelerates printing by eliminating the requirement for the printhead to move to a margin before printing. With the bidirectional Model 5256, lookahead should further enhance production by allowing the printhead to print while moving in either direction.

☐ Limitations

The only significant limitation of the 5250 for the applications intended could possibly be print speed. The Model 5225 line printer (280 to 560 lpm) is adequate for all but heavy print applications; and the Model 5256 character printer is limited to 120 cps. If the work requirement calls for simple applications such as printing sales orders or invoices, both printers should be satisfactory. However, extensive printing requirements could cause excessive delays.

Another limitation is the 80-column x 24-line display facility. Such applications as spreadsheets are better presented in 132-column formats, but this is unavailable with any 5250 display.

☐ Distributed Communications

The 5250 can be specified as an inquiry/update data entry and application development system that communicates in a point-to-point or multipoint arrangement with an IBM S/34, S/36, or S/38 processor. The 5250 uses SNA/SDLC protocol and communicates with the host over switched or dedicated lines at rates up to 9600 bps. The new Model 5294 Remote Control Unit, which attaches 5251 Models 11 and 999, 5291, 5292, and 5150/5160 personal computers, supports DDS at speeds up to 56K bps, and CCITT X.21 and X.25 at 4800 and 9600 bps, respectively.

For the S/34, S/36, and S/38, the 5250 operates with local or remote attachment. With the S/34 and S/36, control is provided by the System Support Program. For the S/38, the Control Program Facility manages all 5250 functions. The 5250 operates in local mode only with the Series/1 under control of the Real-Time Programming System.

☐ Distributed Configurations

The 5250 is comprised of 6 display stations (5251 Models 11, 12,

 ©1985 Data Decisions

IBM 5250 Information Display System
Models 3180, 5251, 5291, 5292 & 5294

and 999; 5291; and 5292 Models 1 and 2); 2 line printers (Models 5224 and 5225), 2 character printers (Models 5219 and 5256) and a remote control unit (Model 5294). The latter is a standalone controller, and accommodates up to 8 5251 Model 11, 999, 5291, and 5292 displays or up to 8 IBM 5150 or 5160 personal computers or Model 5219, 5224, 5225, or 5256 printers. The 5251 Model 12 also attaches up to 8 of the same workstations, printers, and personal computers.

The 5251 Models 11 and 999 are essentially identical. Both display 1920-characters in a 24-line x 80-column format, and attach to the 5251 Model 12 or 5294. They are also used as the system console with Systems/34, /36, and /38. The differences between the 2 are that the Model 999 is intended for order-entry applications and comes with a Model 4600 typewriter-style keyboard. Models 5291 and 5292 are functionally the same as 5251 Model 11, except that the 5291 has a low-profile keyboard and tiltable (5 or 10 degrees) screen. Model 5292 is also functionally the same as 5251 Model 11, but provides a 7-color display, a tiltable screen, and a low-profile keyboard. The 5292 Model 2 supports business graphics, and attaches printers, plotters, and film cameras or monitors.

The Model 5219 is a letter-quality correspondence printer which attaches to the 5251 Model 12 and Model 5294 remote control unit. Available in Models DO1 and DO2, it offers 10-/12-/15-pitch printwheels or proportional spacing; 5/6/8 lpi; and up to 172-character print lines. Both offer 96 ASCII or EBCDIC character sets. The DO1 runs at 40 cps; DO2 operates at 60 cps.

The 5225 is a wire-matrix line printer offered in 4 models. Each prints a maximum of 132-character positions at 10 cpi or 198-character positions at 15 cpi. Model 1 is rated at 280 lpm at 10 cpi, or at 195 lpm at 15 cpi. Maximum line length is 7.4 inches. Model 2 is rated at 400 lpm at 10 cpi or 290 lpm at 15 cpi. Maximum line length is 9.8 inches. Model 3 prints at 490 lpm at 10 cpi, or 755 lpm at 15 cpi. Maximum line length is 11.8 inches. Model 4 is the fastest of the group and is rated at 560 lpm at 10 cpi, or 420 lpm at 15 cpi. Maximum line length is 13 inches.

The Model 5256 is a bidirectional serial matrix printer available with rated print speeds of 40 cps (Model 1), 80 cps (Model 2), and 120 cps (Model 3).

In a distributed mode, the 5251 Model 12 communicates with the remote host as a single workstation or as a clustered system. As the latter, the Model 12 interfaces and controls any combination of up to 8 5251 display stations including Models 11 and 999, and Models 5291 and 5292, 8 printers including Models 5219, 5225, or 5256, or 8 5150 or 5160 personal computers.

The new Model 5294 Remote Control Unit is an enhanced version of the controller employed with the 5251 Model 12. Unlike the Model 12, it does not have its own keyboard-display, but does attach the same display stations and printers, and IBM 5150 and 5160 personal computers. It has 4 I/O peripheral ports as standard equipment, with 4 additional ports as options. Thus, up to 8 display stations/personal computers/printers can be attached.

The enhanced facilities of the Model 5294 are principally communication enhancements. The 5294 can interface with DDS at speeds up to 56K bps versus 9600 bps for Model 12; the 5294 can also interface with X.21 and/or X.25. In addition, the 5294 supports "digits only," where the only acceptable inputs to a numeric field are digits (no special characters permitted). The 5294 also provides data compression.

In addition to cluster configurations, the 5251 Model 12 and the 5294 support a form of multidrop called **cable-thru**, where multiple devices share the same line. Cable-thru (feature 2680) accommodates any mix of 4 workstations/printers/personal computers attached in serial-linked fashion. Both the 5251 Model 12 and the 5294 can handle up to 8 daisy-chained peripherals.

Under daisy-chaining, each device is daisy-chained to the next device sharing the line. Display stations and personal computers with cable-thru have additional cable connectors and station address switches. The switches are used to assign a unique address to each station on the line. The station addresses are used by the Model 12 and 5294 or the host processor to send information to or receive information from the attached devices. Twinaxial or coaxial cable is used to link devices. The last device on a line cannot be located more than 5,000 feet from the Model 12 or 5294 or the host processor when twinaxial cable is used. Coaxial cable limits this length to 2,000 feet. When coaxial cable is used to attach workstations, only a single workstation can be cabled-thru; the second workstation must be within 100 feet and be attached to the first by twinaxial cable. Coaxial cable will only support 2 attached workstations or personal computers for each port.

The 5251 Models 11 and 999, Models 5150 and 5160, Models 5291 and 5292, and printers can directly attach to the host using twinaxial or coaxial cable. Twinaxial supports a device located up to 5,000 feet from the host. Coaxial limits this distance to 2,000 feet.

☐ Distributed Utilities

Several utilities are offered by the S/34, S/36, S/38, and Series/1 that let the user define the communications environment for all models of the 5251 display station.

S/34/36 Processors

WSU (Work Station Utility) • aids in the interactive input and editing of data by display prompt, keyboard response/entry operations; WSU can perform more complex operations than those obtainable with DFU.

SSP Interactive Communications Feature • provides interactive communications with programs on other systems. Workstation assembler macros, RPG II and COBOL workstation support, and COBOL using workstation subroutine PRPQ to provide the interface.

3270 Device Emulation Program Product • supports the S/34 and S/36 as a 3271 BSC or 3274 SDLC control unit when attached to a S/3, S/360, or S/370; only local 5250 devices are supported under this emulation.

Personal Computer Emulation Program Product • allows connection of IBM 5150 or 5160 Personal Computer to System/34, /36, and /38 either locally or remotely using a 5251 Model 12 • PC can be used like 5251 Model 11, 5291, or 5292; PC is plug-compatible with those terminals • operates in 3270 emulation mode on System/34, /36, or /38 with 3270 emulation program.

S/38 Processors

CPF Communications Support • supports communications between host and remote 5250 and between S/38 and S/370 Models 135 to 168 and 3030.

CPF Message Facility • the System Operator Services of CPF create, store, queue, route, and authorize message communications among users or programs and users; operator messages can be sent from any station to any other station, or stored and logged for later retrieval.

Personal Computers Emulation Program Product • same as offered with System/34/36.

Series/1 Processors

5250 Information Display Attachment Support 5719-TA1 • supports control and screen formatting of display stations on Series/1 processors under RPS-4.

Screen Format Design Aid Utility 5719-SF1 & Presentation Support 5719-SF2 • supports 5250 and 4978/4979 displays on Series/1 under RPS • screen formats are created and tested interactively, and are retrieved and printed • presentation support subroutines link with user-written applications to interface between the application and the displays.

Personal Computer Emulation Program Product • allows local connection of IBM 5150 or 5160 Personal Computer.

■ SOFTWARE

The 5250 operates under control of local/remote processor software; the following briefly summarizes software support under such host controlled environments.

 ©1985 Data Decisions

IBM 5250 Information Display System
Models 3180, 5251, 5291, 5292 & 5294

☐ Operating System

IBM S/34 & S/36 Processors

The 5250 operates under the facilities of the System Support Program (SSP) product of the S/34 and S/36 in conjunction with other systems software and programs. SSP executes programs, processes messages and data from display stations, forwards information to display or printer stations, and manages disk/diskette storage facilities. Operators run jobs by using command statements, menu statements, or through Operation Control Language (OCL) under SSP.

IBM S/38 Processors

The Control Program Facility (CPF) of the S/38 manages all system functions to which the 5250 is applied. Modularly implemented CPF functions include system control facilities; batch, interactive, and spooling job management; database and device support management; object and library management; programmer services; operator and job log services; and system configuration, security, save/restore, and other services.

IBM Series/1 Processors

The 5250 operates in local direct attach mode with the Series/1 under the control of the Realtime Programming System—Version 4 (RPS-4).

☐ Database Management

IBM S/34 Processors

DFU (Data File Utility) • creates, maintains, and provides access to data files under SSP for 5250 display stations; DFU generates a program based on user responses to queries displayed on the screen.

Sort Utility • arranges file records to user specifications and data content; ideographic character sort utility is also available.

IBM S/38 Processors

CPF Database Management • supports 5250 station functions for simultaneous access to files from both batch and interactive users; multiple access paths by more than one key or index are supported for random or sequential access. Logical field definitions can be used to retrieve and format data from one or more physical files contained in storage.

Interactive Database Utilities • supports creation of program language source files and data files, and information retrieval from data files. A conversion reformat utility also supports database sort, merge, and copy operations.

☐ Communications/Networks

The 5251 Models 12 and 5294 employ SNA/SDLC protocol and communicate over a point-to-point or multipoint switched or dedicated facility. In addition, the 5294 Remote Control Unit also supports attachment to DDS, X.21, and X.25.

☐ Applications Development Aids

IBM S/34 Processors

SDA (Screen Design Aid Utility) • allows the S/34 programmer to create and change 5250 display screen formats and menus • supports interactively designed screen formats and allows screen attributes to be reviewed before the format is generated • ideographics as well as alphanumerics are provided for designating formats or menus.

Workstation Support Subroutines PRPQ • preassembled subroutines that provide COBOL or assembler user access to workstation management and display formatting capabilities of the screen format generator utility.

Business Report/Application Development System (BRADS/34) • permits programmers and nonprogrammers to create, maintain, and update data files; write screen-driven data entry programs; retrieve information from files with simple query; create formatted reports using prompted report generation; and develop new programs • contains spreadsheet generator.

IBM S/38 Processors

CPF Display Device Data Management • display control and format facilities with a minimum of coding through external data description specifications stored in a display device file.

CPF Programmer Services • supports online program development from either local or remote workstations.

IBM Series/1 Processors

5250 Information Display Attachment Support 5719-TA1 • supports display station control and screen formatting on Series/1 processors under RPS-4.

Screen Format Design Aid Utility 5719-SF1 & Presentation Support 5719-SF2 • supports 5250 and 4978/4979 displays on Series/1 under RPS • screen formats are created and tested interactively, and are retrieved and printed • presentation support subroutines link with user-written applications to interface between the application and the displays.

Control Program Facility Support 5714-SS1 • provides Data Description Specifications (DDS) keyboards for Model 5292 Color Display • direct method for using colors to design new formats.

Interactive Data Base Utilities (IDU) 5714-UT1 • supports new color keyboards for Model 5292 • allows user to see effect of color selection during interactive screen design.

■ HARDWARE

☐ Terms & Support

Terms • members of the 5250 family are available for purchase, 30-day rental or 2-year lease • many items including terminals and printers are now available for **purchase only** • IBM permits 55 percent of first-year rental charges to be accrued towards purchase • lease plan cancellation charge is the smaller of lease fees for 5-month period of, or for 25 percent of the remaining term; IBM guarantees no more than a 5-percent rate increase per year for lease contracts • rental or lease plans allow unlimited use.

Support • IBM markets and supports the 5250 through a nationwide network of local offices • maintenance is bundled into rental or lease charges, and priced separately for purchased systems • basic monthly maintenance charge cited in the following text provides for service availability on a Monday through Friday, 7:00 AM to 6:00 PM, 9 consecutive hour basis; various extensions to such service for weekends and before/after standard hours are quoted at percentage premiums over the basic rate; full 7-day 24-hour service adds a 47-percent premium over the basic rate • the 5250 is designated as a Customer Setup Unit (CSU), and may be unpacked, positioned, connected, and checked out by customer personnel to minimize the time required for going online with the units.

☐ 5250 Chain & Cluster Configurations

Members of the 5250 Information Display System include the 5251, 5291, 5292 Display Stations; the 5224 and 5225 Line Printers; and 5219 and 5256 character printers, and the 5294 Remote Control Unit. The 5150 and 5160 personal computers can also be used with the Model 5294 Remote Control Unit and 5251 Model 12.

The 5251 Models 11 and 999, the 5291 and 5292, and the printers require external controllers. These models can only operate in a local direct-attach mode when connected to a host with workstation support. Remote attachment using communication facilities is supported by cluster arrangements on the 5251 Model 12 and Model 5294 Remote Control Unit. The displays and printers can be configured in multiterminal cable-thru arrangements in local direct attach configurations, or by the remote display-controller cluster.

Terminal Chains • cable-thru chaining of the 5251 Models 11 and 999, the 5150 and 5160, the 5291 and 5292, and all printers supports multipoint terminal arrangements on a single host I/O port, or on a cluster port of the 5251 Model 12 and Model 5294 Remote Control Unit • chains of up to 7 terminals can be configured through cable-thru arrangements • see 5250 I/O Channels Section for other details on cable-thru chaining.

©1985 Data Decisions

IBM 5250 Information Display System
Models 3180, 5251, 5291, 5292 & 5294

Terminal Clusters • cluster control is available on 5251 Model 12 and Model 5294 Remote Control Unit • a (single) cluster feature supports up to 8 5251 Models 11 and 999, Models 5150 and 5160 Personal Computers, Models 5291 and 5292 Color Displays, or 5219, 5224, 5225, and 5256 printers through either direct cluster port or cluster port plus cable-thru chaining arrangements • see I/O Channels section and Communications section for details.

☐ I/O Channels

5250-To-Processor Local Attachment

Local host processor attachment is supported by workstation I/O ports on the host computer. Such ports support cable-thru chains of up to 2 terminals for coaxial cable-to-host, twinaxial cable-between-terminal arrangements; or up to 7 terminals for twinaxial-only cable arrangements. A maximum cable length of 2,000 feet of coaxial, or 5,000 feet of twinaxial is specified for such host-to-terminal chains.

Local-attach 5250 terminals include the 5251 Models 11 and 999, Models 5150 and 5160, Models 5291 and 5292 Display Stations, and all printers. All of these units accommodate cable-thru multipoint chaining, and count as a single terminal in configuration schemes.

The host processor has specific configuration maximums with respect to the number of local 5250 terminals supported. Specific 5250-to-host arrangements and maximums are:

5250-To-S/34 Local Attachment • 4 I/O port cable connectors are provided on a basic system for the local attachment of workstations • the first port must be dedicated to a 5250 display/printer station employed as the system console; the remaining ports can accommodate additional local 5250 displays, personal computers, and/or printers in single-terminal or multiterminal chain arrangements • the maximum number of local terminals supported is 8, including the system console; a Workstation Control Expansion feature of the S/34 extends this maximum to 16 terminals.

5250-To-S/36 Local Attachment • 6 I/O port cable connectors are provided on basic system • the first port must be dedicated to a 5250 display/printer station employed as system console; the remaining ports can accommodate additional local 5250 displays, personal computers, and/or printers in single-terminal or multiterminal chain arrangements; maximum number of local terminals supported is 36 including system console.

5250-To-S/38 Local Attachment • the basic Workstation Controller of the S/38 has 8 workstation I/O ports that support up to 12 locally attached terminals in direct or cable-thru arrangements • a Device Control Expansion feature of the S/38 extends support from these 8 ports to a total of 20 workstations • alternately, a Device Interface Expansion feature adds 8 additional I/O ports to also extend support to 20 terminals • a second Workstation Controller, and/or Device Control or Interface Expansion feature extends the maximum number of local terminals supported to 40.

5250-To-Series/1 Local Attachment • a 5250 Information Display System Attachment feature for the Series/1 provides 4 ports that support up to 8 local terminals in direct or cable-thru arrangements.

5250-To-5250 Device Attachment

As described above in the 5250-To-Processor Local Attachment section, local-attach 5250 terminals (5251 Models 11 and 999, 5291 and 5292, Models 5150 and 5160, 5219, 5224, 5225 and 5256) can be configured in cable-thru chains of up to 7 terminals. In addition, these local-mode terminals can also be employed in remote environments when clustered with 5251 Model 12 and 5294 Remote Control Unit. Such clusters can support up to 4 (Cluster feature), or 8 (Dual Cluster feature) terminals in addition to the parent 5251 Model 12 remote display station, for a maximum cluster size of 5 or 9 terminals. Direct or cable-thru arrangements are also supported for such cluster configurations.

2680 Cable-Thru • 2-/7-terminal chaining feature for 5251 Models 11 and 999, 5291 and 5292 displays, 5150 and 5160, and 5219, 5224, 5225, and 5256 printers:

$5/$3 mo	$100 prch	$1.00 maint

2550 Cluster • attachment feature connects up to 4 5251 Models 11 and 999, 5291 and 5292 displays, 5150 and 5160, and 5219, 5224, 5225, and 5256 printers to 5251 Model 12 display-controller:

78/66	1,139	10.50

2551 Dual Cluster • attachment feature connects up to 8 5251 Models 11 and 999, 5291 and 5292 displays, 5150 and 5160, and 5219, 5224, 5225, and 5256 printers to 5251 Model 12 display controller:

154/131	2,278	20.50

3600 Expanded Function • provides control for magnetic stripe reader on 5251 Model 11 or 5292:

NA/NA	105	NC

☐ Communications

The 5251 Model 12 remote display station-controller and 5294 Remote Control Unit communicate with S/34, S/36, and S/38 host processors equipped with communication adapters; remote communication with Series/1 not supported • data transmission is half-duplex over half-/full-duplex point-to-point or multipoint leased lines at rates up to 9600 bps, or point-to-point switched lines (DDD) at 4800 bps; DDS attachment to 9600 bps is optional • SNA/SDLC is used for all communications • 5294 Remote Control Unit supports attachment to DDS at speeds up to 56K bps; an X.21 interface at speeds to 4800 bps; and an X.25 packet-switching network • X.25 attaches through X.21 adapter feature at speeds to 4800 bps or RS-232C interface at speeds of 2400/4800/9600 bps • special features or attachments required for 5251 Model 12 and Model 5294 include the following:

3701 EIA Interface • connects 5251 Model 12 attachment to IBM or non-IBM modem; cannot be installed on displays equipped with either a DDS adapter or an integral modem:

$19/$16 mo	$447 prch	$3.00 maint

4703 Internal Clock • provides timing and synchronization at 1200 bps for modems not equipped with such features:

6/5	218	1.00

5500/5502 Non-Switched Manual Answer Integrated Modem • 1200-bps integral modem for 5251 Model 12; cannot be installed on display stations equipped with either an EIA interface or DDS adapter:

26/22	686	5.00

5650/5651 Digital Data Service (DDS) Adapter • point-to-point/multipoint integral adapter for DDS transmissions at 2400, 4800, 9600, or 56K bps over AT&T Dataphone Digital Service network; cannot be installed on display stations equipped with either an EIA interface or an integral modem:

36/31	873	4.00

5655 X.21 Adapter • provides interface for connecting a DCE with interface complying with CCITT X.21, X.24, and X.27 • used with Model 5294 for SDLC communication over nonswitched facilities:

NA/NA	350	6.00

5680 X.25 Support • allows Model 5294 to be attached to X.25 packet-switching networks • supports HDLC protocol for X.25 communication • requires feature 3701 or 5655 and 3610 Adapter Card:

NA/NA	260	6.00

MO: monthly charge including maintenance for 30-day rental/2-year lease. PRCH: purchase price. MAINT: monthly maintenance charge for purchased units. NA: not available/applicable; items marked NA under rental/lease are now available for purchase only. NC: no charge. Prices current as of March 1985.

©1985 Data Decisions

IBM 5250 Information Display System
Models 3180, 5251, 5291, 5292 & 5294

3610 Adapter Card • provides card space within Model 5294 to install feature 5680 or expanded function 3600:

NA/NA	210	NC

3845/3846 Data Encryption Device • provides communications security under the NBS Data Encryption Standard (DES) algorithm published as FIPS 46, January 15, 1977; 3845 series units are tabletop configurations, and 3846 models are suitable for rackmount installation; requires EIA interface.

3845 Model 11A • single half-duplex encryption unit for both BSC and SDLC applications:

201/NA	2,765	6.00

3845 Model 12A • dual half-duplex encryption unit for both BSC and SDLC applications:

325/NA	4,535	8.00

3845 Model 13A • single full-duplex encryption unit for both BSC and SDLC applications:

298/NA	4,180	8.00

3846 Model 12A • dual half-duplex rackmount unit for both BSC and SDLC applications; lacks bypass switch contained on 3845 models that allows messages to be sent in the clear and for fault isolation tasks:

256/NA	3,550	4.00

3846 Model 13A • single full-duplex rackmount unit for both BSC and SDLC applications; lacks bypass switch contained on 3845 that allows messages to be sent in the clear and for fault isolation tasks:

235/NA	3,250	4.00

External Modems

External IBM or equivalent non-IBM modems can be used for 5250-to-host remote communications. External modem is used in lieu of internal integrated Modem or DDS adapters, and attaches to 5250 via EIA interface. IBM modems used with the 5250 include the following models.

3863 Modem • 2400 bps with 1200-bps half-speed fallback and automatic remote speed selection • Model 1 communicates in half-/full-duplex mode over unconditioned 4-wire dedicated facilities in a point-to-point or multipoint arrangement • Model 2 communicates in half-duplex mode over 2-wire switched facilities in a point-to-point arrangement • auto-answer is standard on Model 2 and available on Model 1 with 4-wire SNBU option • Model 1 can be equipped with Fan Out feature that allows modem attachment to up to 3 terminals (only 1 can transmit at a given time), and with 4-Wire Switched Network Backup (SNBU) feature for auto-answer switched backup capabilities.

3863 Model 1 • 2400-/1200-bps nonswitched modem:

$102/$87 mo	$2,685 prch	$13.00 maint

3863 Model 2 • 2400-/1200-bps switched modem:

110/94	2,935	15.50

3901 Fan Out • 3-terminal attachment for Model 1 modem:

34/29	804	2.00

7953 SNBU • auto-answer switched backup for Model 1:

54/46	1,180	10.00

3864 Modem • 4800 bps with 2400-bps half-speed fallback and automatic remote speed selection • Model 1 communicates in half-/full-duplex mode over unconditioned 4-wire dedicated facilities in a point-to-point or multipoint arrangement • Model 2 communicates in half-duplex mode over 2-wire switched facilities in a point-to-point arrangement • auto-answer is standard on Model 2 and available on Model 1 with 4-wire SNBU option • Model 1 can be equipped with Fan Out feature that allows modem attachment to up to 3 terminals (only 1 can transmit at a given time), and with 4-wire Switched Network Backup (SNBU) feature for auto-answer switched backup capabilities.

3864 Model 1 • 4800-/2400-bps nonswitched modem:

176/150	3,715	21.00

3864 Model 2 • 4800-/2400-bps switched modem:

188/160	3,925	22.00

3901 Fan Out • 3-terminal attachment for Model 1 modem:

34/29	804	2.00

7953 SNBU • auto-answer switched backup for Model 1:

54/46	1,180	10.00

3865 Modem • 9600 bps with 4800-bps half-speed fallback and automatic remote speed selection • Model 1 communicates in a point-to-point arrangement and Model 2 in multipoint arrangement in half-/full-duplex mode over unconditioned 4-wire dedicated facilities • both models can be equipped with Fan Out for attachment of up to 3 terminals (only 1 can transmit at a given time), and with 4-wire Switched Network Backup (SNBU) for auto-answer switched backup capabilities • Model 1 can also be equipped with Data Multiplexer feature for subchannel operation at 9600, 4800/4800, 4800/2400/2400 or 2400/2400/2400/2400 bps at full-speed, or 4800 or 2400/2400 at half-speed operation.

3865 Model 1 • 9600-/4800-bps point-to-point modem:

282/240	5,885	30.50

3865 Model 2 • 9600-/4800-bps multipoint modem:

282/240	5,885	30.50

3901 Fan Out • 3-terminal attachment:

34/29	804	2.00

7953 SNBU • auto-answer switched backup:

54/46	1,180	10.00

3260 Data Multiplexer • subchannels for Model 1 modem:

47/40	1,075	4.00

3872 Modem • 2400 bps with 1200-bps half-speed fallback for communication in half-duplex mode over 2-/4-wire facilities; multipoint arrangement • point-to-point, multipoint tributary, switched network, switched network backup (SNBU), alternate voice, and 3-terminal Fan Out are optional • separate modem sharing the same power supply and cabinet is also optional, but is mutually exclusive with Fan Out and switched backup options.

3872 • 2400-/1200-bps multipoint modem:

163/NA	2,975	19.00

1051/1052 • first/second modem alternate voice:

25/NA	525	0.50

3901 Fan Out • 3-terminal attachment:

36/NA	701	1.00

5101/5102 • first/second modem multipoint tributary:

23/NA	490	3.00

6101/6102 • first/second modem point-to-point:

8/NA	244	1.50

6302 • second modem:

134/NA	2,445	13.00

7941/7942 • first/second modem switched network:

25/NA	525	7.00

7951 • switched network backup (SNBU):

13/NA	349	3.00

7952 • switched network backup (SNBU) with auto-answer:

25/NA	525	3.00

The 5251 Models 2 and 12 do not support the Auto-Call Originate attachment option for the 3272 modem.

☐ Cluster Controllers

Two cluster controllers are offered: the 5251 Model 12 and Model 5294 Remote Control Unit. Both controllers attach up to 8 terminals/printers/personal computers, and communicate with the host processor under the SNA/SDLC and BSC protocols (see Distributed Configurations and Distributed Communications for particulars). The only differences between the two are that the Model 5294 supports attachment to DDS at speeds to 56K bps, has an optional X.21 interface, and supports connection to an X.25 PDN. It has no keyboard/display, but provides 4 I/O peripheral ports as standard equipment.

©1985 Data Decisions

IBM 5250 Information Display System
Models 3180, 5251, 5291, 5292 & 5294

Model 5294 in its base configuration allows 4 peripherals to be supported. Through its extended cluster facility (feature 2550), up to 4 additional peripherals can be attached. Extended communication consists of CCITT X.21 (feature 5655) and X.25 (feature 5680), both of which can be field upgraded (see Communications section for details). The standard communication interface is RS-232C, and standard data transmission is half-duplex at rates of 2400/4800/9600 bps.

Model 5294 is configured from a terminal keyboard, and employs battery-backed RAM to retain data. Established configurations are held in and loaded from diskette, and users can add/delete peripherals via the keyboards. In addition, the 5294 permits microcode changes to be downline loaded from the host processor to the controller's diskette, and also provides data compression for the save/restore operations associated with the attached display terminals.

The 5251 Model 12 supports only SNA/SDLC and is intended for switched or dedicated networks. This product, described under Terminals section, also employs an RS-232C interface and transmits data at 2400/4800/9600 bps.

001 Model 5294 Remote Control Unit • 4 I/O interfaces for attaching workstations/printers/personal computers • system diskette • RS-232C interface:

NA/NA mo	$2,650 prch	$12.00 maint

2550 Extended Cluster • provides 4 additional I/O interfaces:

NA/NA	835	NA

3610 Feature Adapter • provides card space in 5294 to install X.25 support feature (5680):

NA/NA	210	NC

☐ Terminals

Buffered keyboard display stations are employed as terminals on the 5250 Information Display System. Terminal buffer size equals number of displayable screen characters, with data or code loaded from host processor under program control, or from attached display keyboard. Display screen buffer sizes include a 1920-character, 24-line x 80-character format. Data displayed on 5251 Model 12 can be printed locally.

Display images on the 5250 can be unformatted with no defined fields, or formatted with program-defined fields and field attributes. Formatted fields can be protected from operator modification or unprotected. Format fields are filled or modified from display keyboard. Fields and field attributes of the 5250 include alphanumeric, alpha-only, numeric-only input; mandatory field entry and field fill; uppercase-only, right adjust, and signed numeric input fields; field bypass and duplication; blink, intensity, reverse video, underscore, column bar separator, and nondisplay attributes; and light pen field select.

3180 Model 2 Display Station Configuration • local-mode display terminal for direct attachment to S/36 and S/38 processors; remote mode through 5294 Remote Control Unit; up to 4 terminals per cluster or 8 terminals with Extended Cluster option 2550 (see I/O Channels and Communications sections for details) • modular detached typewriter or data-entry style keyboard with numeric pad keys • plug-compatible with 5251 Model 11.

Display • 15-inch diagonal CRT; tilt and rotate base • 1920 characters at 24 lines x 80 characters; 25th status line • 8x11 dot matrix • 96 EBCDIC or ASCII; 222 EBCDIC/APL; custom character sets • blink and nonblink underscore and block cursor.

Edit & Format Features • auto-repeat keyboard • 10, 12, or 24 user-function keys • cursor up, down, left, right, pad; home, new line, tab, backtab, key functions; cursor address write • character insert and delete • protocol and numeric-only fields • record/playback keystrokes • selector light pen field select • blink, intensity, reverse video, underscore, nondisplay attributes.

Communications • remote attachment only through 5294 remote control unit • see 5250 Communications section for details.

Peripherals • mag card reader or mag hand scanner • cluster printer via controller.

3180 Model 2 Display Station • 1920-character display:

NA/NA mo	$2,195 prch	$9.25 maint

5251 Display Station—Models 11 & 999

Configuration • local mode display terminal for direct attach to S/34, S/38, or Series/1 processors; remote only through 5251 Models 2, 12, and 5294 clusters; up to 7-terminal cable-thru chains and 9-terminal clusters (see I/O Channels section and Communications section for other particulars) • modular (detached) typewriter- or data entry-type keyboards with numeric and cursor keypads.

Display • 15-inch diagonal; 8x16 dot matrix • 1920 characters at 24 lines x 80 characters • 96 EBCDIC/188 EBCDIC Multinational sets • blink/non-blink underscore cursor.

Edit & Format Features • auto-repeat keyboards; 24 (numeric shifts) user function keys • cursor up, down, left, right pad; home, new line, field tab, field backtab, roll-up, roll-down, backspace key functions; cursor address read/write; clear input; character insert and delete; protected, alpha-only, numeric-only, mandatory fields; light pen field select (S/38 remote-only); blink, intensity, reverse video, underscore, column separator, and non-display attributes • local print.

Communications • remote attach only through 5251 Model 12 • see Communications section for details.

Peripherals • mag stripe card reader • cable-thru chain feature • see 5250 I/O Channels section for details.

5251 Model 11 • 1920-character display:

$144/NA mo	$2,135 prch	$18.50 maint

5251 Model 999 • 1920-character display Model 4600 keyboard and feature 2680 cable-thru:

167/NA	2,500	22.50

3600 Expanded Function • provides control for magnetic stripe reader:

16/NA	225	1.50

4600 Keyboard • 83-key typewriter EBCDIC with numeric pad:

19/16	265	3.00

4601 Keyboard • 66-key data entry EBCDIC • supported on S/38 only:

19/16	265	3.00

4602 Keyboard • 66-key data entry EBCDIC with embedded numerics • supported on S/38 only:

19/16	265	3.00

4655 Keylock • locks terminal to prevent unauthorized access:

NA/NA	42	NC

4905 Multinational Character Set • 188-character foreign language display character set:

2/2	58	1.00

4910 Mag Stripe Reader • reads numerically-encoded credit or ID cards • not supported on direct-attach S/38:

20/17	318	2.50

6300 Light Pen • not supported on S/34, S/36, or Series/1, or on direct-attach S/38:

38/33	570	7.50

5251 Display Station—Model 12

Configuration • standalone to 9-terminal cluster display controller for remote attach to S/34, S/36, and S/38 processors (see Communications section for additional details) • modular (detached) typewriter- or data entry-type keyboards with numeric and cursor keypads.

Display • 15-inch diagonal; 8x16 matrix • 1920 characters at 24 lines x 80 characters • 96 EBCDIC/188 EBCDIC Multinational sets • blink/nonblink underscore cursor.

Edit & Format Features • auto-repeat keyboards; 24 (numeric shifts) user function keys • cursor up, down, left, right pad; home, new line, field tab, field backtab, roll-up, roll-down, backspace

 ©1985 Data Decisions

IBM 5250 Information Display System
Models 3180, 5251, 5291, 5292 & 5294

key functions • cursor address read/write; clear input; character insert and delete; protected, alpha-only, numeric-only, mandatory fields; light pen field select (S/38 remote-only); blink, intensity, reverse video, underscore, column separator, and nondisplay attributes.

Communications • 1200/2400/3600/4800/7200/9600 bps; half-duplex SNA/SDLC; EBCDIC code; RS-232C interface; block transmission mode; multipoint polling/addressing • see 5250 Communications section for additional details.

Peripherals • mag stripe card reader • cluster (4-terminal) or dual cluster (8-terminal) attachment • see I/O Channel section for additional details.

5251 Model 12 • 1920-character display-controller:

$229/NA mo	$3,040 prch	$40.00 maint

4600 Keyboard • 83-key typewriter EBCDIC with numeric pad:

19/16	265	3.00

4601 Keyboard • 66-key data entry EBCDIC • supported on S/38 only:

19/16	265	3.00

4602 Keyboard • 66-key data entry EBCDIC with embedded numerics • supported on S/38 only:

19/16	265	3.00

4655 Keylock • locks terminal to prevent unauthorized access:

NA/NA	42	NC

4905 Multinational Character Set • 188-character foreign language display character set:

2/2	58	1.00

4910 Mag Stripe Reader • reads numerically-encoded credit or ID cards • requires 3600 Expanded Function feature:

20/17	318	2.50

6300 Light Pen • requires 3600 Expanded Function feature • not supported on S/34 and S/36:

38/33	570	7.50

3600 Expanded Function • supports copy transfer between cluster displays and printers under program control (not supported by S/34 and S/36) • provides mag stripe reader control for cluster display card readers; not supported by S/34 and S/36 • provides selector light pen control for cluster; not supported by S/34 and S/36 • provides self-check keyed numerics validation for cluster:

16/14	225	1.50

5291 Display Station

Configuration • local-mode display terminal for direct attachment to S/34, S/38, or Series/1 processors; remote mode through 5251 Model 12 clusters and/or 5294 Remote Control Unit; up to 4 terminals per cluster or 8 terminals with dual-cluster option (see Communications section and I/O channels for other particulars) • modular, detached typewriter keyboard with numeric clusters and cursor keypads • plug-compatible with 5251 Model 11.

Display • 15-inch diagonal screen, tiltable CRT • 1920 characters at 24 lines x 80 characters; 25th status line • glare reduction filter • 8x9 dot matrix • 96 EBCDIC character set • blink/nonblink block or underscore cursor.

Edit & Format Features • cursor up, down, left, right, pad, home; cursor address read/write • reverse video • tab to new line, field, or backtab • roll up/down • protected fields • input fields can be delimited as protected alphanumeric, alpha/numeric only, signed numeric, field exit required, right adjust, mandatory entry/fill/bypass, auto-enter, dup enable, monocase • 24 programmable function keys.

Communications • remote attach only through 5251 Model 12 or Model 5294 • see 5250 Communications section for details.

Peripherals • same as 5251 Model 11, except does not support light pens, magnetic stripe readers, or multinational character sets.

5291 Model 2 Display Station • 1920-character display:

NA/NA mo	$1,850 prch	$9.00 maint

5292 Color Display Station

Configuration • local-mode display terminal for direct attachment to S/34, S/36, S/38, or Series 1 processors; remote mode through 5251 Model 12 clusters and/or 5294 Remote Control Unit; up to 4 terminals per cluster or 8 terminals if dual-cluster option used (see 5250 Communications section and 5250 I/O Channels for other particulars) • modular, detached typewriter keyboard with numeric and cursor keypads • plug-compatible with 5251 Model 11.

Display • 15-inch diagonal screen tiltable CRT • 1920 characters at 24 lines x 80 characters; 25th status line • displayable colors red, green, turquoise, yellow, pink, blue, and white • glare reduction filter • 8x16 dot matrix • 96 EBCDIC character set • blink/nonblink, block, or underscore cursor.

Edit & Format Features • same as Model 5291.

Communications • same as Model 5291.

Peripherals • same as Model 5291.

5292 Model 1 Color Display Station • 1920-character display:

NA/NA mo	$4,950 prch	$35.00 maint

5292 Model 2 Color Display Station • same facilities as 5292 Model 1 • also supports business graphics with 480x288 addressable points • includes 3 output ports for attaching printers, electronic film cameras or monitors, and IBM XY/749 Digital Plotter or other plotters:

NA/NA	6,995	41.00

☐ Printers

Serial and line printer models used on 5250 follow the same direct attach, cable-thru chain or cluster configuration rules as observed by 5251 Models 1 & 11, 5291 & 5292 display terminals.

5219 Printers

Configuration • tabletop, letter-quality, printwheel printers • attaches to Series/1, Systems 34/36/38, 5251 Model 12 and Model 5294 • remote-mode only through 5251 Model 12 and Model 5294 clusters; up to 7 terminal cable-thru chains and 9-terminal clusters with 5251 Model 12 or 8 printers via the 5294; see 5250 I/O Channels section and 5250 Communications section for details.

Printer • 40/60 cps (Models D01/D02) bidirectional printing • 10-/12-/15-pitch or proportional spacing; 172-character line • 5/6/8 lpi; half-line spacing for super/subscripts to a single level • 96 ASCII/EBCDIC character sets • single-sheet hand-fed; cut-sheet and envelope feed optional • forms tractor for continuous forms optional • maximum paper width 15.4 inches; maximum pin-to-pin width on forms tractor 13.2 inches • maximum print-line depth 21 inches.

5219 Model D01 • 40-cps printer:

NA/NA mo	$5,420 prch	$54.00 maint

5219 Model D02 • 60-cps printer:

NA/NA	5,835	58.50

7850 Tractor Feed • variable-width tractor for continuous forms:

15/NA	325	8.00

1200 Auto-Paper Handler • provides paper sensors for continuous forms feed (7850) or cut-sheet attachment (7860):

17/NA	156	8.00

7860 Cut Sheet Feeder • handles cut-sheet paper:

75/NA	1,850	20.00

5224 Printers

Configuration • tabletop matrix impact printer • direct attach to S/34, S/38, or Series/1 processors; remote mode through 5251 Model 12 and Model 5294 cluster feature • up to 7 cable-thru chains with twinaxial cable; see 5250 I/O Channels section and 5250 Communications section for details.

©1985 Data Decisions

IBM 5250 Information Display System
Models 3180, 5251, 5291, 5292 & 5294

Printer • 140/240 lpm (Models 1 and 2) at 10 cpi and 95/170 lpm at 15 cpi; 7x8 matrix impact • 95 EBCDIC/184-character multinational (including ASCII graphics) sets • 132 columns at 10 cpi and 198 columns at 15 cpi; 6/8 lpi; tractor platen; 4-part forms.

5224 Model 1 • 95-/140-lpm printer:

NA/NA mo	$6,395 prch	$48.00 maint

5224 Model 2 • 170-/240-lpm printer:

NA/NA	7,280	57.00

9470 Multinational Character Set • 188-character foreign language print set including ASCII graphics:

NC/NC	NC	NC

9570 Spanish Character Set • 95-character Spanish language print set (N and n capability):

NC/NC	NC	NC

5225 Printers

Configuration • floor-standing matrix impact line printer • dual 256-character receive and dual 198-character print buffers • direct attach to S/34, S/38, or Series/1 processors; remote mode only through 5251 Model 12 and Model 5294 clusters; up to 7-terminal cable-thru chains and 9-terminal clusters; see 5250 I/O Channels section and 5250 Communications section for details.

Printer • 280/400/490/560 lpm (Models 1/2/3/4) at 10 cpi and 195/290/355/420 lpm at 15 cpi; 7x8 matrix impact • 96 EBCDIC/188 EBCDIC Multinational sets • 132 columns at 10 cpi and 198 columns at 15 cpi; 6 or 8 lpi; tractor platen; 4- to 6-part forms.

5225 Model 1 • 280-lpm printer:

NA/NA mo	$12,075 prch	$109.00 maint

5225 Model 2 • 400-lpm printer:

NA/NA	13,945	152.00

5225 Model 3 • 490-lpm printer:

NA/NA	15,495	188.00

5225 Model 4 • 560-lpm printer:

NA/NA	16,940	224.00

1470 Audible Alarm • signals abnormal condition:

NA/NA	50	NA

5256 Printers

Configuration • tabletop serial matrix impact printer • dual 256-character receive and dual 198-character print buffers • direct attach to S/34, S/38 or Series/1 processors; remote mode only through 5251 Models 12 and Model 5294 clusters; up to 7-terminal cable-thru chains and 9-terminal clusters; see 5250 I/O Channels section and 5250 Communications section for additional details.

Printer • 40/80/120 cps (Models 1/2/3) bidirectional 7x8 matrix impact • 96 EBCDIC/188 EBCDIC Multinational sets • 132 columns at 10 cpi; 6 or 8 lpi; 3- to 15-inch forms tractor; 5-part forms; 3- to 14-inch form length.

5256 Model 1 • 40-cps printer:

NA/NA mo	$3,110 prch	$45.50 maint

5256 Model 2 • 80-cps printer:

NA/NA	3,255	49.50

5256 Model 3 • 120-cps printer:

NA/NA	3,400	56.00

9470 Multinational Character Set • 188-character foreign language print set:

NC/NC	NC	NC

1470 Audible Alarm • signals abnormal condition:

NA/NA	50	NA

• **END**

©1985 Data Decisions

IBM 5280 Distributed Data Systems
Models 5285, 5286 & 5288

■ PROFILE

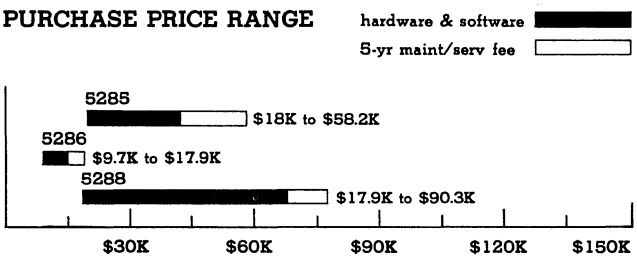
Function • user-programmable, single- or multiterminal, small-scale system supporting local and distributed (5285/5288 only) mode data entry, inquiry, RJE and applications program tasks.

Architectures Supported • 5285/5288 attach to S/370, 303X, 4300 series in BSC or SNA/SDLC distributed architectures in point-to-point or multipoint configurations • attaches to 8100 Information System via DPPX/BASE or via 3270 Emulation under SDLC • BSC 3741-type key-to-diskette data entry system, 3780-type terminal, or S/3-type MRJE • SNA/SDLC operation as LU-1-type terminal • 5286 attaches in noncommunicating mode to Series/1, Systems/3/32/36/38/370, 303X, 4331, 8100, and non-IBM systems.

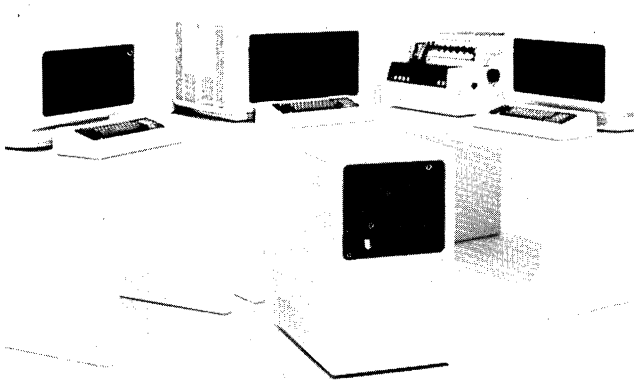
Communications • 5285/5288 run under CICS/VS and ACF/VTAM on DOS/VSE, or CICS/VS, IMS/VS, ACF/VTAM, and ACF/TCAM on OS/VS distributed host supported networks • single-line, 600 to 4800 bps, half-duplex BSC/SDLC, ASCII/EBCDIC code facilities; not supported on multiterminal 5285 systems or on 5286 • 3270 emulation via 5285/5288; BSC/SDLC.

Operating System • 5280 SCP provides operating system facilities with up to 8 partitions; maximum 4 foreground or 7 background • sequential, direct, and key-indexed data set organization.

PURCHASE PRICE RANGE



IBM 5280 PURCHASE PRICING bar graphs cover price ranges between "small" and "large" configurations for software and hardware products (solid bars), and for associated 5-year maintenance/service fees (open bars) • **5285 small system** consists of 5285 Model EO5 with 128K of RAM, single diskette, SCP, 1920-character display, a model 3402 diskette expansion (2D), a model 5281 ZOO display and associated keyboard, a 5285 keyboard, a Model 1210 terminal interface, a Model 1240 remote diskette attachment, a 3701 EIA RS-232C interface, a Model 1152 printer attachment, and a Model 5217C2 printer; **large system** includes Model EO5 with 1920-character display, a Model 3410 Disk System, 3 Model 3402 Diskettes, 3 Model 5281 ZOO displays and associated keyboards, a 5285 keyboard, 4 Model 1240 remote diskette attachments, 4 Model 1210 terminal interfaces, a Model 3701 RS-232C interface, a Model 1152 printer attachment, and 2 Model 5217C2 printers • **5286 small system** consists of 5286 D10 Dual Programmable Data Station with 96K bytes of RAM, 2 diskette drives, and 2 keyboards; **large system** adds a Model 1215 terminal interface, a Model 1240 remote diskette attachment, a Model 5282 dual data station, and 4 keyboards • **5288 small system** consists of Model 5288 CO5 with 64K bytes of RAM, a single diskette, 2 Model 5281 ZOO displays with associated keyboards, 2 Model 3402 diskette drives, 2 Model 1240 remote diskette attachments, a Model 1255 terminal interface, a Model 1280 terminal interface, a Model 1152 printer attachment, a Model 5217C2 printer, and a Model 3701 RS-232C communication interface; **large system** consists of Model 5288 JO5 with 288K bytes of RAM, a single diskette, SCP, 4 Model 5281 ZOO displays and associated keyboards, a Model 1255 terminal interface, 3 Model 1280 terminal interfaces, a Model 1155 printer attachment, a Model 2680 printer cable-through, 4 Model 5224-2 printers, 2 Model 3410 disk drives, and a Model 3701 RS-232C interface • Note: all prices are for single-quantity purchase; discounts will lower actual purchase price.



The IBM 5280 clustered terminal system supports data entry, inquiry, RJE, and local processing applications, but suffers from slow auxiliary storage devices and inefficient job handling.

Database Management • supports sequential data set organization; sequential, direct by relative record number, and key index/value accessing.

Transaction Processing Management • locally through 5280 SCP • distributed through host CICS or IMS which acts as terminal-oriented transaction monitor with file processing facilities • supports send and receive, batch and inquiry tasks.

Support Software • DE/RPG and assembler; host compiled COBOL • diskette data set maintenance utilities • sort/merge • 3740-to-5280 Program Conversion • data entry/edit support.

Processor • separate microprocessor controls applications processing, keyboard/display, diskettes, printers, and communications • 64K- to 288K-byte RAM • 246K- to 9.7M-byte diskette • 10M- to 70M-byte disk • 7 printers on 5285 and up to 8 printers on 5288 systems.

Terminals/Workstations • up to 4 keyboard-display terminals per system.

First Delivery • 1980.

Systems Delivered • unknown.

Comparable Systems • functionally comparable to number of small-scale systems or programmable terminals marketed by many vendors for local/remote processing tasks; IBM orientation towards distributed processing in relation to host systems makes 5280 to S/370 relations somewhat akin to Datapoint 1800 to ARC, DEC PDT-11 to PDP-11, etc configurations.

Vendor • International Business Machines (IBM) Corporation, Information Systems Group • National Accounts Division; 1133 Westchester Avenue, White Plains, NY 10604; 914-696-1900 • National Marketing Division; 4111 Northside Parkway, Atlanta, GA 30327; 404-238-2000.

Canadian Distribution • IBM Canada Limited; 3500 Steeles Avenue East, Markham, ON L3R 2Z1 • 416-474-2111.

Distribution • worldwide through local IBM sales/service offices.

GSA Schedule • listed.

©**1985 Data Decisions**

IBM 5280 Distributed Data Systems
Models 5285, 5286 & 5288

■ ANALYSIS

The 5280 is one of many general-purpose clustered terminal systems that support data entry, inquiry, RJE, and local application processing. Three versions are offered: the 5285, 5286, and 5288. All are user-programmable, have their own rudimentary operating system, support diskette storage, and attach slaved terminals that also support their own diskettes. Application software support consists of DE/RPG compiler and an assembler, plus host-compiled COBOL. The 5285 and 5286 both support host communication, allowing attachment to such hosts as S/370, 303X, and 4300 series. They also support disks. The 5286 provides local processing but no communication facility, nor does it support disks.

The viability of systems like the 5280 is questionable especially in light of the alternatives. Specifically, the personal computer with its first-rate operating systems, extended RAM facilities, hard disk storage, mountains of packaged software application packages, and a communication facility provides very strong competition for the 5280. As for interactive processing, users have a host of protocol emulation packages to choose from which make the personal computer emulate an IBM 3270. In fact, some of the newer protocol emulators allow uploading/downloading of files—something not offered with native-mode 3270 operation.

On the plus side, the 5280 does offer extended auxiliary storage and supports local multiprogramming. Depending on the configuration, the 5280 can be equipped with up to 9.7M bytes of diskette or up to 70M bytes of disk storage. Although neither of these devices are particularly fast, somewhat better performance can be achieved through hard disk. The diskettes, for example, have an average access time of 243 milliseconds and the disks have an access time ranging from 16.6 (cylinder-to-cylinder) to 205 milliseconds. Average access time is 85 milliseconds (102 cylinders).

While the operating system, called the System Control Program (SCP), supports up to 8 partitions in a multiprogramming environment, its method for servicing interrupts is inefficient (see Limitations). In addition, the common system utilities are main-storage resident, reducing the RAM available for processing applications.

Once a viable product, the 5280 has been upstaged by the advent of personal computers, specifically the IBM PC. Users should strongly consider the PC to service 5280-like applications because it offers far greater benefits.

The 5160 PC/XT can be equipped with a DOS 2.1 operating system; up to 640K bytes of RAM; 40K bytes of ROM, up to 720K bytes of diskette; and up to 30M bytes of hard disk storage. The PC is also offered with a color display; good database management facilities; a ROM-based cassette-level BASIC interpreter; a diskette-based Disk/Advanced BASIC, plus APL, Logo, Pascal, FORTRAN, and COBOL computers and macro assembler. Its communication facilities include TTY-terminal emulation and file-transfer operations supported by a communication utility under IBM DOS. Emulators are also offered for 5250 and 3270 terminal emulation, and BSC/SDLC protocols are supported. RJE is also supported under 3270 emulation.

The PC also supports local and remote clusters, and operates in a 3270 environment in emulation mode. The 5280 can also emulate the 3270, but is restricted to the older 3271 Model 2 controller under BSC and 3274 Model 1C under SNA/SDLC. Terminal emulation is also restricted to the older monocromatic 3277 Model 2.

The PC/XT is also price competitive. A loaded 5160-087 consisting of a base system (CPU, 128K-byte RAM, 40K-byte ROM containing Cassette-Level BASIC interpreter, 360K-byte diskette drive, 10M-byte hard disk, RS-232C interface) plus optional DOS 2.0, BASIC 2 interpreter, Pascal support, additional 512K-byte RAM, an additional 10M-byte disk drive, an additional 360K-byte diskette, color graphics monitor, an 80-cps graphics printer, SDLC communication interface, plus word processing and spreadsheet costs about $12,000. A standalone 5285 E05 with communication facilities and 128K-byte RAM, a single 2D format diskette (up to 606K-byte capacity), a 10M-byte hard disk, BSC/SDLC communication interface, no software other than SCP and no printer costs $11,588. The 80-cps Model 5222-1 (a nongraphics printer) costs $2,345.

□ Strengths

For users that require a clustered terminal system with local processing capabilities, the 5280 satisfies the need. Its operating system, if used correctly, can satisfactorily handle up to 4 foreground jobs (i.e., keyboard applications) or up to 7 background partitions. And, a good amount of the processing can be done with minimal host/communication load. With its 3270 emulation facility, the 5280 can also take advantage of the services available to user of that popular IBM system.

For users with extensive printing requirements, the 5280 provides a good line of printers, one of which operates at 560 lpm. In addition, up to 8 printers can be attached to 5288.

The S/3 MRJE multileaving capability is another system strength. MRJE permits the concurrent transmission and reception of data to/from peripheral devices and the network via the full-duplex capabilities of the communication line.

Finally, the security capabilities offered by IBM's data encryption option offers another "strength." The security algorithm is based on the NBS Data Encryption Standard and functions with both BSC and SDLC.

□ Limitations

A good number of the 5280's limitations have already been pointed out in the analysis. However, there are 2 principal weaknesses that require further amplification. These are poor job interrupt handling by the SCP and slow diskette access times.

The first limitation—and by far the most serious in our opinion—rests with the way partitions are serviced and interrupts are handled. The 5280 permits 8 partitions to be established. Of these up to 4 may be foreground, with a keyboard associated with each partition. The other upper-configuration limit allows 7 background and 1 foreground partition. A keyboard may have more than 1 background partition.

Partitions are serviced sequentially beginning at F1 (highest priority) and ending with the last background (lowest priority). The problem arises when an interrupt (in this case when an ATTN key is struck) occurs in a higher priority partition while a lower priority partition is being serviced. In this case, service ceases in the lower partition and control is transferred to the higher. After the interrupt has been serviced, the operating system first checks to see if any other ATTNs are queried to that partition and services them. If not, control is passed to the **next partition** in line—not to the partition that was initially interrupted. The net result of this interrupt handling scheme is that lower priority partitions receive considerably less service than they need, with the result that overall processing in general degrades.

If you're planning on running a multipartition system, keep this limitation in mind. After all, everyone can't be F1.

The next limitation rests with the slow speed of the diskettes. These units operate at 360 rpm, providing a data transfer rate of 1 byte every 32 microseconds (2 bytes on the dual-density version). With a seek time of between 40 and 80 milliseconds, track-to-track access of 5 milliseconds, head settle of 35 milliseconds, and rotational delay of 35 milliseconds, this works out to an average access time of 243 milliseconds. While this figure is not the worst we've seen for a diskette, it is something to consider if you're planning to share data sets and you anticipate constant interaction. Users can relieve this situation somewhat by opting for the optional disks, but those units aren't all that fast either. For example, the 3410 Disk Storage drive provides 256K bytes per sector, 32,768 bytes per cylinder, and 303 cylinders for programs and data. Minimum access time is 16.6 milliseconds for cylinder-to-cylinder, and average access time is 85 milliseconds (102 cylinders). The maximum access time is 205 milliseconds. The same caveats given to diskettes apply here also.

■ COMMUNICATIONS FACILITIES OVERVIEW

□ Distributed Communications

The 5280 may be specified as a batch/inquiry, remote job entry, and multileaving remote job entry terminal in a point-to-point and multipoint environment. The batch/inquiry program supports

 ©1985 Data Decisions

IBM 5280 Distributed Data Systems
Models 5285, 5286 & 5288

SNA/SDLC communications as an LU1-type terminal to an S/370, 303X or 4300 running under CICS/VS or IMS/VS. The 5280 also supports BSC and communicates with the S/370, 303X, and 4300 under CICS/VS, IMS/VS or VSE POWER. BSC may also be used to interface with S/3/32/34. Communications in BSC or SNA/SDLC environments are supported on the programmable 5285/5288 models. The programmable dual display 5286 will not, however, support communications.

A 5280 to 3270 emulation program offered with the 5285/5288 emulator selected 3270 control units. Under BSC, a 3271 Model 2 running on multipoint nonswitched or multipoint nonswitched with switched network backup is emulated. For SNA/SDLC, the 3274 Model 1C operating on point-to-point or multipoint nonswitched, or point-to-point switched is emulated for both BSC and SDLC, the 3270 emulation is performed for the same keyboards/display; and printer as follows: 3277-2 keyboard/displays; 5280 data entry/typewriter/proof keyboards with up to 24 program function keys; 3284/3286/3288 BSC printers; 3287 SNA LU 1 and 3 printer.

☐ Distributed Configurations

The 5280 may be configured to handle data entry, remote batch/inquiry/printing, remote job entry, and local data processing. To meet these device needs, the 5280 provides 11 basic components—the 5285 Programmable Data Station; the 5286 Dual Programmable Data Station; the 5281 Data Station; the 5282 Dual Data Station; the 5288 Programmable Control Unit; and the 5217, 5222, 5224, 5225, 5242, and 5256 printers.

These components function as building blocks which can be arranged to meet the processing requirement. For example, a Local Data Entry configuration could consist of a 5281 Data Station; 5288 Programmable Control Unit; and a 5217 or 5222 printer. This same configuration handles communication by adding the 2500 Communications Adapter to the 5288, and substituting the faster 5256 printer.

A Remote Batch/Inquiry or RJE application can be handled by a 5285 Programmable Data Station with the 2500 Communications Adapter, and a 5225 line printer. The 5285 can also share a 5281 or 5282, and attach 1 of the printers to provide a Local Processing Facility.

If your needs call for relatively powerful local processing with a communication capability, the 5288 can be configured to handle up to 4 5281s or 5282s and 6 diskettes; and a maximum of 8 printers. The 6 diskettes include those available with the 5281 Data Station. Unfortunately, no disks are supported by 5286.

For applications requiring greater storage capacity/faster access times, 10M bytes of disk storage (feature 3410) can be employed. Disk storage drives can be installed on the 5285, 5288, and 5281 when attached to the 5285 or 5288. The disk drive occupies 1 physical diskette drive position on these machines. A 5285 can contain up to 3 disk drives; a 5288 can contain up to 7. Note: 1 diskette drive is standard on the 5285. A 5285 system including an attached 5281 or 5282 can contain up to 3 additional diskette or disk drives in any combination. The 5282 dual data station can only contain 2 diskette drives. One diskette drive is also standard on the 5288. A 5288 system with attached 5281 and 5282 data stations can contain up to 7 additional diskette or disk drives in any combination.

☐ Distributed Communications Utilities

Seven different Communications Utilities allow the user to define the communications environment for operation in remote batch, inquiry, RJE, or distributed environments. These utilities consist of a Multipoint Monitor, RJE Description, Multileaving RJE, SNA RJE, SNA Data Communications, BSC Data Communications, and BSC Batch Transfer, and 3270 emulation.

Multipoint Monitor Utility • responds to host polling and selects local terminal; no communications program need be loaded into memory.

RJE Description Preparations Utility • defines Multileaving RJE (MRJE) or SNA RJE execution utility tasks • Data Description statements define SNA Data Communications, BSC Data Communications, BSC Batch Transfer, or BSC Online Test execution utility tasks.

Multileaving RJE (MRJE) Utility • allows 5280 to function as remote job entry S/3-type terminal with S/370 hosts under JES 2, 3, and RES • printer, punch, card reader and console may operate concurrently; printer streams directed to printer, display or diskette; punch data streams go to diskettes.

SNA RJE (SRJE) Utility • allows 5280 to function as RJE workstation in SNA/SDLC environment; no other communications program can be implemented while SRJE is running.

SNA Data Communications Utility • supports send/receive batch, and inquiry tasks in SNA/SDLC environment • up to 4 SNA data communications utilities operating under the same IMS or CICS subsystem may run concurrently • multiple transmit, receive, and inquiry functions may be executed as single job • data transmitted from diskette or disk and keyboard.

BSC Data Communications Utility • supports send/receive batch and inquiry tasks • 5280 appears to DOS/VSE POWER host as 3741 or 3780 terminal • multiple transmit, receive, and inquiry functions may be executed as single job • data transmitted from diskette or disk and keyboard.

BSC Batch Transfer Utility • supports batch send/receive operations on 5280 as 3741 terminal • multiple transmits and receive may run as single job.

3270 Emulation • allows 5285/5288 to function as IBM 3270 terminal using BSC/SDLC • provides device emulation, BSC/SDLC transfer, and BSC/SDLC program interface.

3270 Batch Transfer Utility • supports transmit/receive of graphic data records to host using 3270 interactive protocals in BSC network • user-written program must be provided on host system.

■ SOFTWARE

☐ Terms & Support

Terms • with the exception of bundled 5280 System Control Programming (SCP), all software incurs continuous monthly support or license fee charges.

Support • 5280-resident software is supported under IBM Central and Local Programming Services; host-resident COBOL facilities supported under IBM Central and Hot-line telephone assistance services • 30-day testing period provided with all 5280-related software.

☐ Programming Overview

The 5280 supports data entry, inquiry, and RJE tasks in conjunction with host systems and local applications in a multiprogramming environment. The 5280 System Control Program (SCP) services applications on a fixed-partition basis, with partitions serviced sequentially based on partition number. All foreground partitions are serviced before background partitions. SCP also reacts to interrupts from higher-priority partitions, transferring control to them.

Up to 8 application partitions, plus partitions for common functions, are supported. An application partition can range from at least 6K up to the maximum available main storage. Foreground partitions are associated with keyboard functions; since a maximum of 4 keyboards are supported by 5280, there can be only 4 foreground partitions. Background partitions are not associated with a particular keyboard. Programs operating in background are normally independent in nature and require minimal operation interaction.

The common area contains information and functions that can be used by any device or program. Depending on the common function option selected, the area will use about 6K, 15K, or 16K bytes of user storage. Typical common functions are operations that attach a partition to a keyboard, load a program into a partition, display machine check and I/O error codes, request owner ID and allowing access to access-protected disks/diskettes.

Users employing optional disk storage should not have to modify programs, procedures, or data sets when transferring data from diskettes or disk. However, assembler language programs, COBOL programs which access multivolume data sets, user

 ©1985 Data Decisions

IBM 5280 Distributed Data Systems
Models 5285, 5286 & 5288

programs that use physical device addresses, and user programs that assume a maximum allocation of data sets may need to be modified. In addition, keep in mind that some IBM programs contain different or modified prompts when referring to disk. Thus, procedure control language procedures using these programs may need to be modified.

The BSC and SNA data communications utilities allow data sets to be transferred directly to the printer. Also, all BSC and SNA communication access methods cancel themselves (if optioned) at the successful completion of a job. This allows the next communication utility to load its associated communication access method (CAM) without requiring the operator to cancel previous CAMs.

On the procedure control language, a procedure can CALL another procedure. Up to 12 levels of nesting are allowed. The called procedure executes in the same partition as the procedure issuing the CALL. Control returns to the calling procedure. For menu utilities, the user can optionally specify the minimum size partition into which a program can be loaded. The menu utility also allows multiple menu configuration record data sets to reside on a single diskette or disk. The advantage of this is that the entire contents of multiple diskettes can be transferred to disk with no conversion required. Menus can also be printed.

The data set display utility allows a data set record search based upon a user-specified value. Character-string searches are also permitted.

☐ Operating System

5280 System Control Programming (SCP)

Provides operating system-type facilities for 5280 Distributed Data System via 4 program modules implemented by display prompts • Initial Program Load (IPL) contains system configuration specifications required to complete power-on sequences and system initialization • System Configuration allows user to generate IPL by specifying requirements; describes both logical and physical 5280 system parameters • PTF/Patch allows for implementation of IBM-supplied program corrections or updates, or of user program revisions via program temporary fixes (PTFs) or program patches • sequential, direct and keyed sequential data set organization/retrieval • Close Failure Recovery allows for access to data that would otherwise be lost due to not properly closing data sets • supports up to 8 partitions, 4 of which can be foreground • bundled 5280 SCP program number is 5708-SC1:

NA mo	NC prch

☐ Database Management

The database management facility is fairly rudimentary, and is part of the SCP. Only sequential data set organizations are supported; data sets are sequential as entered, sequential by key value, and sequential by an indexed data set. Access methods are sequential, direct by relative record number, and key indexed. The data set organization and access methods are defined by the user program.

Diskette/disk data sets can be shared. Data sets can be labeled as shared read or shared read/write (update) to allow multiple programs to access the same data set. If users do not wish to share a data set, a lock-out facility is available.

☐ Communications/Networks

Communications in BSC or SNA/SDLC environments is supported on programmable 5285 or 5288 members of the 5280 Distributed Data System family; the programmable dual-display 5286 will not, however, support communications. (See 5280 Hardware section for particulars on host communications environment and interfacing.)

5280 Communications Utilities

Provides preparation and execution communications utilities for 5280 operations in remote batch, inquiry, RJE, or distributed terminal environments • Multipoint Monitor utility provides response to host polling and selections without requiring communications program to be loaded into memory • Communications Configuration preparation utility allows user to define 5280 communications environment; configurations entered control access method when executing communications programs • RJE Description preparation utility defines Multi-Leaving RJE or SNA RJE execution utility tasks • Data Description preparation utility defines SNA Data Communications, BSC Data Communications, BSC Batch Transfer, or BSC Online Test execution utility tasks • Multi-Leaving RJE (MRJE) execution utility allows the 5280 to function as remote job entry S/3-type terminal with S/370-type hosts; 5280 is always remote workstation which must initiate transmission, and no other communications program may be run while in this mode; MRJE supports transmission of 5280 keyboard input or disk/diskette data to remote host and the reception of host transmissions onto 5280 diskette, printer, or display; MRJE requires minimum 48K-byte memory • SNA RJE (SRJE) execution utility allows the 5280 to function as RJE workstation in SNA/SDLC environment; while SRJE is running on 5280, no other communications program may be implemented; SRJE supports transmission of 5280 keyboard input and disk/diskette data to remote host, and the reception of host transmissions onto 5280 disk/diskette, printer, or display • SNA Data Communications execution utility supports both send and receive batch, and inquiry tasks on 5280 in SNA/SDLC environment; up to 4 SNA data communications utilities operating with the same IMS or CICS database/data communications host subsystem can be run concurrently; multiple transmit, receive, and inquiry functions may be executed as single job; 5280 keyboard and disk/diskette batch transmissions, and keyboard-only inquiry transmissions to host are supported; host transmissions to 5280 disk/diskette, printer, or display are supported • BSC Data Communications execution utility supports send and receive batch, and inquiry tasks on 5280 in BSC environment; 5280 appears to host as 3741 or 3780 (for DOS/VSE POWER hosts) terminal; 5280 keyboard, disk/diskette, or mag stripe reader, batch inputs to host, and keyboard-only inquiry to host transmissions are supported; host transmissions to 5280 disk/diskette, printer, or display are supported; multiple transmit, receive, and inquiry functions may be executed as single job • BSC Batch Transfer execution utility supports disk/diskette batch send/receive operations on 5280 as 3741 terminal; multiple send and receive operations may be executed as single job • BSC communications requires 5285/5288 with minimum of 32K bytes, disk/diskette drive, and 960-character display; MRJE requires a minimum of 48K and SNA/SDLC a minimum of 64K bytes of memory • 5280 Communications Utilities program number is 5708-DC1:

$27 mo	$900 prch

5280 to 3270 Emulation Program • 3270 emulation via 5285/5288 • emulates 3271 Model 2 under BSC on multipoint nonswitched or multipoint nonswitched with switched network backup; emulates 3274 Model 1C under SNA/SDLC on point-to-point or multipoint nonswitched, or point-to-point switched • keyboard/display and printer emulation of 3277-2, 3284, 3286, 3287, 3288 • emulation program consists of 3270 BSC/SDLC communication access method (CAM); BSC program interface for DE/RPG and 5280 COBOL; SRJE/CAM; plus following utilities: batch transfer, BSC/SDLC display/print, and 3270 device emulation configuration:

53	1,700

☐ Program Development/Languages

5280 DE/RPG • provides RPG compiler and source entry programs enabling users to write 5280 data entry and applications programs on the 5280 system; source program generates DE/RPG statements via extensive DDS-type display prompting for ease of program entry • DE/RPG data entry display formatting features provide for data field, prompt, or message highlighting via intensity, blink, reverse video, underscore, column separator, and/or non-display attributes; for defining data and prompt areas on the display screen; and for the display of

MO: monthly charge, including service. PRCH: one-time purchase fee. NA: not applicable. NC: no charge. Prices current as of May 1985.

©1985 Data Decisions

IBM 5280 Distributed Data Systems
Models 5285, 5286 & 5288

multiple formats concurrently • DE/RPG character/field/record editing features include character checking via acceptable shifts (alpha and alpha-only, numeric and numeric-only, digits-only, and hexadecimal); field check against specified self-check modulus or character pattern; auto duplicating fields from previous records or other sources; conditionally bypassing fields; field validation based on sequence, range of values, tables or arithmetic expressions; auto data insertion of a constant, a specifically defined field, or results of an arithmetic expression; substituting table for field data; and performing arithmetic calculations • DE/RPG data entry capability also includes facilities for providing production statistics on a job and workstation basis; and an RPG III Calculation Specification subset for complex editing, formatted printing, expanded arithmetics, and master data set access that may be used in conjunction with 5280 Communications Utilities • DE/RPG application programming facilities consist of an RPG III subset for arithmetic calculations, data move/compare, branching, indicator and bit testing, subroutine operation, and disk/diskette, printer, display terminal, and communications I/O; sequence of operations is user defined, and RPG cycle does not apply; noninteractive programs may be written for background partition mode operation • 5280 DE/RPG requires 9K bytes for compiler, 13K for source program, either dual single-density or single double-density diskette, 5280 SCP, and 5280 Utilities facilities • DE/RPG program number is 5708-DE1:

$16 mo	$550 prch

5280 Format Design Aid • creates DE/RPG source code from display image entered by user at a 5280 Display Station • provides multiple format and T FILE processing support for data entry programs; supports 480/960/1920-character displays; provides listing and/or sequencing of generated source code • requires 48K/64K/64K-byte storage on 5285/5286/5288 • program number is 5798-RCR; program charge is for 12 months:

NA	600

5280 Assembler • provides control statements and instructions enabling users to write 5280 programs on the 5280 system • instructions describe arithmetic and logical operations, branching, I/O operations, and internal partition data transfers • control statements define storage allocation, data areas, and prompts • ACL-to-assembler conversion package for running 3740 programs on 5280 • requires 9K bytes of memory, diskette drive, 5280 SCP, and 5280 Utilities • assembler program number is 5708-AS1:

55	1,750

COBOL • IBM S/370-type host system COBOL compilers for generating 5280 machine language load programs • COBOL facilities include Nucleus, Workstation Support, Data Communications, Language Feature, I/O Feature, and Debugging Features modules • Nucleus provides punctuation characters, arithmetic operators, OF and IN qualifier connectives, plurals of figurative constants, comparison of nonnumeric operands, and levels 01 to 49 facilities; also provides PERFORM verb and higher-level forms of ACCEPT, ADD, COMPUTE, DISPLAY, DIVIDE, IF, MOVE, MULTIPLY, and SUBTRACT • Workstation Support module consists of language extension with set of verbs and syntax to control display terminal; user may program for such functions as data entry, inquiry, and file update, providing appropriate display prompts, data field positioning, attributes, etc • Data Communications under COBOL employs a CALL interface for BSC or SNA/SDLC remote station data transfers in conjunction with Communications Utility • Language Feature allows the definition and processing of fixed-length 3D tables, the division of COBOL programs into segments that may overlay one another, text copying from library to a program, and the transfer of control from one COBOL program to another within a partition • I/O Feature permits COBOL interaction with sequential, relative, and indexed data files; records may be read, written, revised, and deleted within a COBOL program • Debugging Feature includes compile-time storage maps and execution-time snapshots of data areas, flow trace to identify last statement executed before abnormal termination, and other error checking and debugging aids • COBOL load programs require minimum of 16K bytes on 5280 • program number is 5708-CB1 for OS/VS hosts and 5708-CB2 for DOS/VSE processors:

214	5,950

☐ Other Facilities

5280 Utilities • provides various diskette, key entry, conversion, allocation, and status functions • Diskette/Disk Compress Utility rewrites existing data sets to place all unallocated space into contiguous area that can be used for storage of additional data sets • Diskette/Disk Copy Utility provides data copy facility from one area to another area on a diskette/disk or from diskette/disk to diskette/disk; image copy function copies entire contents of one diskette/disk onto another; volume copy function copies data sets from one diskette/disk onto another; data set copy function combines up to 4 data sets into a new data set or adds data to an existing data set; specify copy record function copies data beginning with first and ending with last relative record number specified by user into another data set; specify key copy function copies records specified by user keys; and single drive data set copy function allows single drive system to copy data sets from one diskette to another via memory buffer and diskette interchange operations • Diskette/Disk Data Set Clear Utility clears data set(s) for the recording of new data or the rewrite of remaining data sets; data cleared may be recovered or optionally erased so that it cannot be recovered • Diskette/Disk Initialization Utility performs surface analysis and formats diskette/disk to user specifications • Diskette/Disk Label Maintenance Utility allocates new data set space, deletes old data sets, and modifies volume and data set labels • Diskette/Disk Label List Utility prints or displays contents of label • Diskette/Disk Print Utility prints all data set records; prints only specified data set(s); prints data beginning with first and ending with last user-specified relative record number; or prints records specified by user keys • Key Entry Utility provides user with programming facilities to write simple data entry programs using IBM 3740 Key Entry String Language • 3740 Format Utility converts existing 3740 formats into DE/RPG source programs • Resource Allocation Utility changes or deletes physical device address logical identifiers • Systems Status Utility provides methods to review system activity, or to print or display IPL system configuration • menu facility allows creation and use of menus; creates data set and stores menu titles describing it • Display Utility provides way to scan through a data set • requires from 9K to 11K bytes of memory • 5280 Utilities program number is 5708-UT1:

$8 mo	$250 prch

5280 Sort/Merge • provides facilities to sort records in a data set into specified sequence and then merge the sorted records into another data set without altering the original data set • Full Record Sort facilities place the entire sorted data set into a new data set • Address Out facilities sort user-specified relative record number data sets in order and then writes them into new data set • Record Subset facilities sort records containing selected fields in order and then writes them into new data set • Index/Key facilities sorts user-keyed records in order along with relative record numbers of original data set and then writes them into an index/key data set • Merge program combines records from 2 diskette data sets into another diskette data set without altering the original data sets; may be employed for multivolume data sets • Command Data Set Display program displays or prints contents of sort/merge command data set • requires minimum of 16K bytes of memory • 5280 Sort/Merge program number is 5708-SM1:

16	400

3740-to-5280 Program Conversion • various software facilities are available with the 5280 for the conversion and use of 3740 programs • 5280 Key Entry Utility provides facilities for writing data entry programs using 3740 Key Entry String Language • 5280 Format Utility converts existing 3740 formats into DE/RPG source programs; functions that may not be converted and must be programmed by DE/RPG source statements include online and off-line field totals, field and record selection, constant insertion, printer formatting and control, and edit control • 5280 Assembler ACL conversion package allows 3740 users to convert to 5280 assembler language; although the languages are somewhat similar, certain parts of the programs may have to be rewritten • the IBM Diskette 1 format initialized at 128 bytes per sector is employed on both 3740 and 5280 and allows for the basic exchange of data sets.

5280 Construction Data Entry/Edit Support • provides 5280 off-line data entry and editing support for System/34 Construction Management and Accounting System (CMAS/34) •

 ©1985 Data Decisions

IBM 5280 Distributed Data Systems
Models 5285, 5286 & 5288

builds transaction files for batch input to CMAS/34 payroll, accounts payable, job costing, and general ledger systems • program number is 5798-RBZ; program charge is for 12 months:

NA	50

■ HARDWARE

□ Terms & Support

Terms • members of 5280 family available on purchase, 30-day rental, or 2-year lease basis • lease/purchase agreements • volume discounts for 5285, 5286, and 5288 are 10 percent for 6 to 19 units; 13 percent for 20 to 49 units; 16 percent for 50 to 99 units; and 19 percent for 100 or more units • rental or lease plans provide for unlimited use.

Support • IBM markets and supports the 5280 through a nationwide network of local offices • maintenance is bundled into rental or lease charges and priced separately for purchased units; basic monthly maintenance charges cited in the text provide for service availability on a Monday through Friday, 7:00 AM to 6:00 PM, 9 consecutive hour basis; various extensions to such service for weekends and before/after standard hours are quoted at percentage premiums over the basic rate; full 24-hour, 7-day per week service adds 47% premium to cited basic rates • the 5280 is designated as a Customer Setup Unit (CSU) and may be unpacked, positioned, connected, and checked out by the customer to minimize time required to go online • IBM offers at extra cost various classroom or self-study courses on 5280 operations and functions.

□ 5280 Distributed Data Systems

Configurations of the 5280 are based on the 5285 Programmable Data Station, the 5286 Dual Programmable Data Station, or the 5288 Programmable Control Unit. Depending on the programmable 5280 controller, the system may be configured with the satellite 5281 Data Station or 5282 Dual Data Station; the 5222, 5224, 5225, and/or 5256 Printer; and communications facilities.

The 5285 is a tabletop programmable data station with a single keyboard and display. This data station can support 7 printers, communication, and either an IBM 5281 or 5282 auxiliary data station; it also supports all licensed programs offered for the system. The 5285 must have at least 1 diskette drive; 1 additional diskette or disk drive can be added. When either a 5281 or 5282 auxiliary data station is attached, the 5282 can support combinations of additional diskette and/or disk drives, up to a maximum of 3 additional drives. The available display sizes are 960 and 1920 characters. The maximum storage size is 128K.

The 5286 is a tabletop programmable data station with a split screen and two keyboards. It allows two operators seated at the same data station to simultaneously share the system. Each operator has a 480-character display, a keyboard, and diskette drive. The keyboards must be of the same type. The 5286 can support either a 5281 or 5282 auxiliary data station and all licensed programs except the Communications Utilities (5708-DC1) and the 5280 to 3270 Emulation Licensed Program (5708-EM1). The 5286 has a minimum of 2 diskette drives (both of these must be the same type). When either a 5281 or 5282 auxiliary data station is attached, the 5286 can support a maximum of 2 additional diskette drives. The 5286 does not support disk drives. The maximum storage size is 96K.

The 5288 is a floorstanding programmable control unit, and must have at least 1 diskette drive and at least 1 attached 5281 or 5282 auxiliary data station. A maximum of 3 additional diskette or disk drives can be added. The maximum storage size is 288K. When additional 5281 or 5282 auxiliary data stations are attached, the 5288 can support combinations of additional diskette and/or disk drives, up to a maximum of 7 additional drives. The 5288 also supports a maximum of 8 printers (in combinations that include up to 4 5217, 5222, and 5242 printers, and up to 8 5224, 5225, and 5256 printers). The 5288 supports all licensed programs offered for the system.

5285 Configurations • 5285 Programmable Data Station with 64K/96K/128K-byte memory supporting single 5281 Data Station or 5282 Dual Data Station (1 to 3 keyboard display terminals per system), and up to 7 printers in non-communicating configurations; diskette storage for 246K to 4.8M bytes on single/dual 5285 and/or 5281/5282 drives (1 to 4 drives per system) • 1 diskette is standard on the 5285; 1 additional drive position is available • a 10M-byte disk can be substituted for optional diskettes on the 5285 and 5281; a 5285 with attached 5281 displays can contain up to 3 10M-byte disks (5282 only supports diskettes); disks/diskettes can be mixed in any combination • 5285 Programmable Data Station with 64K-/96K-byte memory supporting up to 7 printers and communications; diskette storage for 246K to 2.4M bytes on single/dual 5285 drives.

5286 Configurations • 5286 Programmable Dual Data Station with 64K-/96K-byte memory supporting single 5281 Data Station or 5282 Dual Data Station (2 to 4 keyboard display terminals per system) in noncommunicating-only configuration; diskette storage for 246K to 4.8M bytes on single/dual 5286 and/or 5281/5282 drives (1 to 4 drives per system).

5288 Configurations • 5288 Programmable Control Unit with 64K/96K/128K/160K/224K/228K-byte memory supporting up to 4 5281 Data Stations or 5282 Dual Data Stations (intermixed, with 1 to 4 keyboard display terminals per system), up to 7 printers (intermixed), single 5225 Printer, and communications; diskette storage facilities for 246K to 9.7M bytes on single/dual/tri/quad 5288 and/or single/dual 5281/5282 drives (1 to 8 drives per system) • 1 diskette is standard on the 5288; up to 3 physical drive positions are available • a 10M-byte disk can be substituted for optional diskettes on the 5288 and 5281; a 5288 with attached 5281 displays can contain up to 7 10M-byte disks; disks/diskettes can be mixed in any combination.

□ 5280 Programmable Control Units

Application Microprocessors

Application Microprocessor • performs applications, arithmetic, and logic; services peripheral devices; supports up to 8 partitions • employs variable time slices (60 milliseconds for key entry, CAM and DE/RPG; 4 milliseconds for DE/RPG in rerun mode; 12 milliseconds for all other jobs) • controls microprocessors servicing diskettes, printers, and communications • 64K- to 288K-byte RAM • 246K- to 9.7M-byte diskette • 10M- to 70M-byte disk • up to 8 printers • in dual microprocessor configurations, each can be user-assigned to specific contiguous partitions; alternatively, each microprocessor can be assigned to all partitions.

6800 Microprocessor • optional microprocessor for use with 5285/5286/5288 systems • cannot be used with 2500 Communications Adapter on 5285:

$61/$52 mo	$1,285 prch	$2.50 maint

5285 Programmable Data Station

Configuration • programmable tabletop keyboard display terminal with 64K/96K/128K memory; integral single-/dual-diskette drives and modular keyboard • a single 10M-byte disk can be used in place of second diskette • model changes field installable • can attach 1 5281/5282 via 2500 adapters • can attach 1 5217, 5222, 5242 or up to 7 5224, 5225, and/or 5226 printers via 5285 twinax printer attachment (feature number 1150) • can attach a IBM 5217 Model C2, 5222, or 5242 Model 2 printer via start/stop printer attachment (feature number 1152).

Diskette Storage • integral single/dual drives available in IBM Diskette 1 only format and/or Diskette 1, 2, and 2D (1/2/2D) format • Diskette 1 format provides 246K/284K/303K bytes per diskette capacity for 128/256/512 bytes per sector • Diskette 2 format provides 492K/568K/606K bytes per diskette capacity for 128/256/512 bytes per sector • Diskette 2D format provides

MO: first figure is monthly charge for short-term rental; second figure is for 2-year lease. Both include prime-shift maintenance. PRCH: purchase price. MAINT: monthly charges for prime-shift maintenance. NA: not available. NC: no charge. All prices are for single quantity; discounts are offered. Prices current as of May 1985.

©1985 Data Decisions

IBM 5280 Distributed Data Systems
Models 5285, 5286 & 5288

985K/1.1M/1.2M bytes per diskette for 256/512/1024 bytes per sector.

Disk Storage • nonremovable 10M-byte disk drive; substituted for second diskette drive (see Disk/Diskette section for details).

Display • 8x16 matrix • 480-character at 6-line x 80-character format standard; 960-/1920-character at 12-/24-line x 80-character optional; all display screens in multiple terminal systems must have same size format • 94-character EBCDIC/ASCII sets; 185-character Multinational set.

Keyboards • 4600, 4601, 4602, and 4603.

Communications • 600 to 4800 bps • half-duplex BSC/SDLC • ASCII/EBCDIC code • point-to-point/multipoint • not supported in multiterminal 5285 plus 5281 or 5282 configurations (see Communications section for other particulars) • IBM 3270 Emulation Communications Adapter provides aforementioned functions, plus supports 5280 to 3270 Emulation licence program (5708-EM1).

5285 C01 • programmable data station with 64K memory and single Diskette 1 format drive:

$343/$292 mo	$6,213 prch	$46.00 maint

5285 C05 • programmable data station with 64K memory and single Diskette 1/2/2D format drive:

374/318	6,463	53.50

5285 D01 • programmable data station with 96K memory and single Diskette 1 format drive:

377/321	6,526	48.00

5285 D05 • programmable data station with 96K memory and single Diskette 1/2/2D format drive:

408/347	6,776	56.00

5285 E01 • programmable data station with 128K memory and single Diskette 1 format drive:

410/349	6,839	50.00

5285 E05 • programmable data station with 128K memory and single 1/2/2D format drive:

442/376	7,089	58.00

3500 Display • 960-character 5285 display:

6/5	112	1.00

3505 Display • 1920-character 5285 display:

19/17	225	1.00

5286 Programmable Dual Data Station

Configuration • programmable tabletop dual keyboard and split-screen dual display terminal with 64K/96K memory, integral dual diskette drives (1 per keyboard/display), and modular keyboards • user-specified 6K-byte partitions • attaches 1 5281 or 5282 • model changes field installable.

Diskette Storage • integral dual drives with formats identical to 5285 diskettes. (See Disk/Diskette Storage section for other particulars.)

Disk Storage • none.

Display • 8x16 matrix • dual 480-character at 6-line x 80-character format; all display screens in multiple terminal systems must have same size format • 94-character EBCDIC/ASCII sets; 185-character Multinational set.

Keyboards • 4600, 4601, 4602, and 4603.

Communications • noncommunicating system.

5286 C02 • programmable dual data station with 64K memory and dual Diskette 1 format drives:

$411/$350 mo	$8,263 prch	$56.00 maint

5286 C10 • programmable dual data station with 64K memory and dual Diskette 1/2/2D format drives:

474/403	8,763	72.50

5286 D02 • programmable dual data station with 96K memory and dual Diskette 1 format drives:

445/379	8,576	58.50

5286 D10 • programmable dual data station with 96K memory and dual Diskette 1/2/2D format drives:

508/432	9,076	74.50

5288 Programmable Control Unit

Configuration • programmable floor console controller with 64K/96K/128K/160K/224K/288K-byte memory and integral single/dual/tri/quad diskette drives • 10M-byte disks can be used in place of optional diskettes • single twinaxial printer attachment (feature 1155) provides single port for attachment of 5224 Models 1 or 2, 5225 Models 1, 2, 3, or 4, and 1 or 5256 Models 1, 2, or 3; maximum of 7 printers can be attached • multiple start/stop twinaxial printer attachment (feature 1162) attaches up to 8 printers; provides 4 start/stop (5242) printer ports and 1 twinaxial printer (5224, 5225, 5256) port • up to 7 twinaxial printers can be attached to twinaxial port using single twinaxial cable • cable-through allows multiple printers to attach to single port.

Diskette Storage • integral drives with formats identical to 5285 diskettes (see Disk/Diskette section for details).

Disk Storage • nonremovable 10M-byte disk drive; substituted for 3 diskette drives (see Disk/Diskette section for details).

Communications • same as Model 5285.

Diskette Storage • integral single/dual/tri/quad drives with formats identical to 5285 diskettes. (See 5285 Diskette Storage section for other particulars.)

5288 C01 • programmable control unit with 64K memory and single Diskette 1 format drive:

$342/$293 mo	$6,913 prch	$39.50 maint

5288 C05 • programmable control unit with 64K memory and single Diskette 1/2/2D format drive:

375/319	7,163	47.50

5288 D01 • programmable control unit with 96K memory and single Diskette 1 format drive:

376/322	7,226	41.50

5288 D05 • programmable control unit with 96K memory and single Diskette 1/2/2D format drive:

408/348	7,476	50.00

5288 E01 • programmable control unit with 128K memory and single Diskette 1 format drive:

409/350	7,539	44.00

5288 E05 • programmable control unit with 128K memory and single Diskette 1/2/2D format drive:

441/377	7,789	52.00

5288 F01 • programmable control unit with 160K memory and single Diskette 1 format drive:

445/379	7,852	46.50

5288 F05 • programmable control unit with 160K memory and single Diskette 1/2/2D format drive:

476/405	8,102	54.00

5288 H01 • programmable control unit with 224K memory and single Diskette 1 format drive:

509/436	8,478	51.00

5288 H05 • programmable control unit with 224K memory and single Diskette 1/2/2D format drive:

541/463	8,728	59.00

5288 J01 • programmable control unit with 288K memory and single Diskette 1 format drive:

577/494	9,104	55.50

5288 J05 • programmable control unit with 288K memory and single Diskette 1/2/2D format drive:

607/520	9,354	63.50

☐ Communications

The 5285/5288 controllers allow either BSC/SDLC data communication over a single link. Controllers can communicate

©1985 Data Decisions

IBM 5280 Distributed Data Systems
Models 5285, 5286 & 5288

over switched point-to-point or nonswitched point-to-point/multipoint lines at speeds to 4800 bps. On a multipoint line, the 5285/5288 operate as a tributary station. The 3270 Emulation Communications Adapter (number 3270) offered with the 5285/5288, provides the same function as the Model 2500, plus supports the 5280 to 3270 Emulation licensed program (5708-EM 1).

Controllers operate half-duplex over switched and nonswitched lines. Switched network support includes manual dial and manual or auto-answer. On a multipoint network, each 5285/5288 must use the same clocking source (modem or business machine). Units must also operate at the same transmission rate, use the same transmission code, and the same 2- or 4-wire connection to the line.

The 5285/5288 controllers using stored program control and BSC protocol communicate with IBM Series 1, System/3, System/32, System/34, System/36, and System/38. Communication with S/370 is via an Integrated Communications Adapter; the 4331 also requires a communication adapter. The S/370, 303X, or 4300 requires a 2701 Data Adapter or a 3704, 3705, 3725 communications Controller operating under ACF/NCP or Partitioned Emulation Program (PEP).

The 5285/5288 using stored program control and SDLC communicate with the IBM 4331 and S/370 via the same communications adapter or front-end communications controller as with BSC. In addition, attachment to the 8100 with DPPX/BASE and/or under 3270 emulation is also permitted. The 3270 Emulation Communications Adpater provides a 1200-bps clocking capability for use with an integrated 1200-bps modem or external modem.

BSC Communications

3270-Type BSC Communications • 5280 appears as IBM 3271 Model 2 when communicating with IBM S/370-type hosts.

3741-Type BSC Communications • 5280 appears as IBM 3741 Data Entry System when communicating with another 5280, a 3740, or a 5265 Point Of Sale terminal, or with the following hosts: IBM Series/1 with RPS; IBM S/3 with CCP or RPG II; IBM S/32 with RPG II; IBM S/34 with SSP-ICF or RPG II; IBM S/370-type processors in DOS/VSE environment with BTAM or CICS or in OS/VS environment with BTAM, TCAM, CICS, or IMS.

3780-Type BSC Communications • 5280 appears as IBM 3780 Communications Terminal when communicating with IBM S/370-type hosts with DOS/VSE POWER.

S/3 MRJE-Type BSC Communications • 5280 appears as S/3 MRJE workstation when communicating with IBM S/370-type host with OS/VS1 RES, OS/VS2 JES2, or OS/VS2 JES3.

SNA Communications

Logical Unit SNA Communications • 5280 appears as LU1-type terminal when communicating with S/370-type processors in DOS/VSE environment with ACF/VTAM, CICS, or POWER; or in OS/VS environments with ACF/VTAM, ACF/TCAM, CICS, IMS, RES, or JES • LU 1, 2, 3 for 3270 emulation.

Communications Modules

2500 Communications Adapter • required on 5285/5288 for attachment of BSC or SNA communications line via modem or other interface • provides 1200-bps clocking for integral or external modem • cannot be used on 5285 with satellite data station attachment:

$90/$77 mo	$1,015 prch	$9.50 maint

3270 Emulation Communications Adapter • supports 5280 to 3270 Emulation licensed program (5708-EM 1); used in conjunction with stored program contrast on 5285/5288 • permits 5285/5288 to function on switched or nonswitched public or private lines to a System/34 or System/38 • required to attach to communication line via adapter interface or modem and supports BSC and SDLC • adapter provides 1200-bps clock for use with integrated 1200-bps modem or external modem • cannot be used with 2500 communications adapter:

136/116	2,040	14.00

3701 EIA Interface • EIA RS-232C, CCITT V.24/V.28 interface for attachment of external IBM or non-IBM modem, or other compatible data communications modules • requires 2500 adapter; cannot be used with 5650/5651 DDS adapter or integral modem:

20/18	372	1.50

5650 DDS Adapter • BSC or SDLC adapter for point-to-point operation over AT&T DDS network • requires 2500 adapter; cannot be used with 3701 EIA interface or integral modem:

35/28	873	1.50

5651 DDS Adapter • BSC or SDLC adapter for multipoint operation over AT&T DDS network • requires 2500 adapter; cannot be used with 3701 EIA interface or integral modem:

35/28	873	1.50

5501 Integrated Modem • 600-/1200-bps switched line integral modem with auto-answer • requires 2500 adapter and 5810 power supply (5285 only); cannot be used with 3701 EIA interface, 5650/5651 DDS adapter, or other integral modem:

36/29	744	3.50

5508 Integrated Modem • 600-/1200-bps nonswitched line integral modem with switched network backup auto-answer • requires 2500 adapter and 5810 power supply (5285 only); cannot be used with 3701 EIA interface, 5650/5651 DDS adapter, or other integral modem:

41/35	947	4.50

3863 Model 1 Modem • 1200-/2400-bps nonswitched line external modem • requires 3701 EIA interface:

102/87	2,685	13.00

3863 Model 2 Modem • 1200-/2400-bps switched line external modem with auto-answer • requires 3701 EIA interface:

110/94	2,935	13.00

3864 Model 1 Modem • 2400-/4800-bps nonswitched line external modem • requires 3701 EIA interface:

176/150	3,715	21.00

3864 Model 2 Modem • 2400-/4800-bps switched line external modem with auto-answer • requires 3701 EIA interface:

188/160	3,925	22.00

3868 Model 2 Modem • 4800-bps rackmounted modem • half-/full-duplex over 4-wire nonswitched facilities • point-to-point/multipoint • requires 3701 EIA interface and 3866 multimodem enclosure:

165/NA	3,340	12.50

3872 Modem • 1200-/2400-bps switched/nonswitched point-to-point/multipoint external modem • requires 3701 EIA interface:

153/NA	2,975	19.00

3845/3846 Data Encryption Device • provides for communications security under NBS Data Encryption Standard (DES) algorithm; 3845 consists of external tabletop configuration, while 3846 may be used for integral rackmount installation.

3845 Model 11A • single half-duplex encryption unit for both BSC and SDLC operations:

201/NA	2,765	6.00

3845 Model 12A • dual half-duplex data encryption unit for both BSC and SDLC operations:

325/NA	4,535	8.00

3846 Model 12A • dual half-duplex rackmount data encryption unit for both BSC and SDLC operations:

256/NA	3,550	4.00

3866 Multimodem Enclosure • provides housing, powering, and cooling for 3868 Models 1 to 4 modems • up to 12 single-width modem packs (3868 Model 1) or up to 6 double-width modem packs (3868 Models 2, 3, and 4) can be housed:

46/NA	1,020	9.00

©**1985 Data Decisions**

IBM 5280 Distributed Data Systems
Models 5285, 5286 & 5288

5810 Power Supply • expansion power unit required for 3701 EIA interface and 5501/5508 integral modem operation on 5285 Programmable Data Station:

4/3	79	1.50

☐ Disks/Diskettes

All members of the 5280 family employ diskettes for auxiliary storage (refer to Distributed Systems and Display Terminals for configurations). In addition, the 5281, 5285, and 5288 can also be fitted with 10M-byte disk systems in lieu of the optional diskettes. The disks can be factory installed or retrofitted to existing units. The price of the diskette is included as part of data station/controller package (see Programmable Control Units section); the disk subsystems and monthly maintenance are priced separately.

Diskette Storage • integral single/dual drives available in IBM Diskette 1 only format and/or Diskette 1, 2, and 2D (1/2/2D) format • Diskette 1 format provides 246K/284K/303K bytes per diskette capacity for 128/256/512 bytes per sector • Diskette 2 format provides 492K/568K/606K bytes per diskette capacity for 128/256/512 bytes per sector • Diskettes 2D format provides 985K/1.1M/1.2M bytes per diskette for 256/512/1024 bytes per sector • data transfer rates are 31.2K bytes per second for Diskette 1 and 2 formats, and 62.5 bytes per second for Diskette 2D format; average access time is 243 milliseconds • 360-rpm rotational speed • read or write overlapped with seek; diskette operations overlapped with processing and other I/P operations • system configuration drives do not require the same formats:

NA/NA mo	NA prch	NA maint

3401 Diskette Drive • reads/writes Diskette 1; requires appropriate remote disk/diskette attachment (number 1240 on 5285/5286 or numbers 1300, 1301, or 1302 on 5288):

67/57	1,000	9.50

3402 Diskette 2D Drive • reads/writes Diskette 1, 2, and 2D; requires appropriate remote disk/diskette attachment (number 1240 on 5285/5286 or number 1300, 1301, or 1302 on 5288):

99/84	1,250	16.50

Disk Storage Drive • nonremovable, disk storage medium • 9,928,704 bytes total capacity • 256 bytes per sector; 32,768 bytes per cylinder; 303 cylinders for programs and data • minimum access time 16.6 milliseconds (cylinder-to-cylinder); average access time 85 milliseconds (102 cylinders); maximum access time 205 milliseconds • 3600-rpm rotational speed:

403/343	4,500	42

4400 Remote Disk Prerequisite • required when attaching 3410 disk storage drive to 5281 data station:

NC/NC	NC	NC

☐ Display Terminals

5281 and/or 5282 keyboard display stations are employed as operator terminals on 5288-based systems and on 5285-/5286-based systems in conjunction with keyboard display facilities of these programmable data stations. All display screen size formats must be identical in multiterminal configurations; satellite or auxiliary 5281/5282 disk/diskette formats do not, however, have to conform to drives employed on 5285/5286/5288 system control units. All models within a class may be field upgraded/downgraded. Replaced parts from any model change, however, must be returned to IBM.

The 5281 is a single, tabletop auxiliary keyboard-display which attaches to a 5282, 5286, or 5288. The 5281 shares the functions of the programmable device to which it is attached, and can be located up to 200 feet from the controlling unit. When attached to a 5285 or 5288, the 5281 can contain 1 or 2 10M-byte disk storage drives. The 5281 can contain 0, 1, or 2 diskette drives, with a total capacity of 2.4M bytes. Any combination of disk/diskette drives is allowed, but when attached to the 5286, only diskettes can be used. The use of disk/diskette drives requires that the 5285, 5286, or 5288 have a remote disk/diskette drive attachment.

The 5282 is a dual, tabletop auxiliary keyboard-display which attaches to the 5285, 5286, or 5288. It employs a single, split-screen CRT with 2 keyboards. The 5282 shares the functions of the programmable device to which it is attached, and can be located up to 200 feet from the controlling unit. The 5282, like the 5181, can contain 0, 1, or 2 diskette drives but does not support disks. Total diskette capacity is 2.4M bytes. If the 5282 employs diskettes, the 5285, 5286, or 5288 must have a remote diskette drive attachment.

5281 Data Station

Configuration • tabletop keyboard display terminal with integral single/dual diskette drives or up to 2 disk drives and modular keyboard • model changes field installable.

Diskette Storage • integral single/dual drives with formats identical to (but not necessarily conforming to) those of the 5285/5286/5288. (See Disks/Diskettes section for other particulars.)

Disk Storage • nonremovable 10M-byte direct-access storage device; up to 2 permitted but none required (See Disks/Diskettes section for details).

Display • 8x16 matrix • 480/960/1920 characters at 6/12/24 lines x 80 characters; display size format set by control unit • 94-character EBCDIC/ASCII sets; 185-character Multinational set.

Keyboards • 4600, 4601, 4602, and 4603.

5281 Z00 • data station with no diskette facilities:

$100/$85 mo	$2,295 prch	$13.50 maint

5282 Dual Data Station

Configuration • tabletop dual keyboard and single display terminal with integral single/dual diskette drives (1 maximum per keyboard display) and modular keyboards • model changes are field installable.

Diskette Storage • integral single/dual drives with formats identical to (but not necessarily conforming to) those of the 5285/5286/5288. (See Disks/Diskettes section for other particulars.)

Disk Storage • none.

Display • single, split-screen display; functions as 2 independent display stations • displays 480 or 960 characters at 6 or 12 lines x 80 characters; 8x16 dot matrix • display size format set by control unit • 94-character EBCDIC/ASCII sets; 185-character Multinational set.

Keyboards • 4600, 4601, 4602, and 4603.

5282 Z00 • dual data station with no diskette facilities:

$108/$92 mo	$2,604 prch	$15.00 maint

5280 Data Station Attachment

Auxiliary or satellite data stations are attached to programmable 5285/5286/5288 control units via the following interfaces • display size format is also determined, and satellite diskettes supported by these controller attachment features • maximum cable length is 200 feet.

1210 Attachment • allows attachment of single 5281 with 1920-character display to 5285 • requires 3505 1920-character display feature on 5285; cannot be used with 5285 having communications capability:

$43/$37 mo	$879 prch	$3.00 maint

1215 Attachment • allows attachment of single 5282 with 480-character dual displays to 5285/5286 • cannot be used with 5285 having communications capability or 960-/1920-character displays:

32/27	767	2.00

1255 Attachment • allows attachment of first 5281 with 1920-character display to 5288 • can only be used in conjunction with other 5288 1920-character display attachments:

19/17	225	1.50

1280 Attachment • allows attachment of additional 5281 with

 ©1985 Data Decisions

IBM 5280 Distributed Data Systems
Models 5285, 5286 & 5288

1920-character display to 5288 • requires 1255 attachment feature:

43/37	879	3.00

1240 Remote Diskette Attachment • allows attachment of 5281/5282 with diskette drive facilities to 5285/5286:

6/5	213	1.00

1300 Remote Diskette Attachment • allows attachment of first remote 5281/5282 drive to 5288 without diskette facilities or of first and second remote drives when 5288 is equipped with single or dual integral drives:

6/5	213	1.00

1301 Remote Diskette Attachment • allows attachment of second remote 5281/5282 drive to 5288 without diskette facilities, or of third and fourth remote drives when 5288 is equipped with single or dual integral drives, or of first and second remote drives when 5288 is equipped with tri or quad integral drives:

40/34	970	4.00

1302 Remote Diskette Attachment • allows attachment of fifth and sixth remote 5281/5282 drive to 5288 with single or dual integral drives, or of third and fourth remote drive when 5288 is equipped with tri or quad integral drives:

6/5	213	1.00

5280 Data Station Keyboards

The following outlines modular keyboard arrangements that may be configured with 5281/5282 nonprogrammable and 5285/5286 programmable data stations • dual display 5282/5286 data stations must employ the same type keyboard.

4600 Keyboard • 83-key typewriter-type keyboard with EBCDIC character set, cursor and numeric keypads, and 24 function keys:

$15/$13 mo	$379 prch	$4.00 maint

4601 Keyboard • 66-key data entry-type keyboard with cursor keypad, embedded numeric keyboard, and 30 function keys:

15/13	379	4.00

4602 Keyboard • 66-key data entry-type keyboard with proof arrangement, cursor keypad, embedded numeric keypad, and 30 function keys:

15/13	379	4.00

4603 Keyboard • 83-key typewriter-type keyboard with ASCII character set, cursor and numeric keypads, and 24 function keys:

15/13	379	4.00

☐ Printers

5217 Model C2 Printer • 60-cps bidirectional matrix-impact tabletop printer • 96 EBCDIC/ASCII/Multinational character set • 10/12/15 cpi; 4 lpi to 24 lpi • single-sheet hand fed paper; pin-feed continuous forms optional • 15.3-inch wide paper; 15.4-inch wide paper pin-to-pin:

NA/NA mo	$4,425 prch	$52.50 maint

7850 Continuous Forms Feed Device • variable-width tractor for feeding continuous forms • required for multipage printing:

NA/NA	325	8.00

5222 Model 1 Printer • 80-cps bidirectional matrix-impact tabletop printer • 95/184 EBCDIC/ASCII/Multinational character sets • 132/198 columns at 10/15 cpi • 6 or 8 lpi • 15-inch tractor feed; 3- to 15-inch continuous or 5.75- to 15-inch precut, 1- to 4-part form paper:

152/129	2,345	34.00

5224 Printers • 140- to 240-lpm matrix-impact tabletop printer • 95/184 Multinational character sets • 132-/198-column at 10/15 cpi • 6 or 8 lpi.

5224 Model 1 Printer • 140/95 lpm at 10/15 cpi:

369/314	6,395	53.00

5224 Model 2 Printer • 240/175 lpm at 10/15 cpi:

422/359	7,280	62.00

5225 Printers • 195- to 560-lpm 7x8 matrix-impact floor console printer • 95/184 EBCDIC/ASCII/Multinational character sets • 132/198 columns at 10/15 cpi • 6 or 8 lpi • 18-inch tractor feed; 3- to 17.7-inch continuous, 1- to 6-part form paper.

5225 Model 1 Printer • 280/195 lpm at 10/15 cpi:

586/499	12,075	119.00

5225 Model 2 Printer • 400/290 lpm at 10/15 cpi:

669/569	13,945	167.00

5225 Model 3 Printer • 490/355 lpm at 10/15 cpi:

744/633	15,495	206.00

5225 Model 4 Printer • 560/420 lpm at 10/15 cpi:

815/694	16,940	246.00

5242 Model 2 Printer • 40-/160-cps bidirectional matrix-impact tabletop printer • 95 EBCDIC character set • 10/15 cpi; 132/198 characters per line; 1 lpi to 12 lpi • tractor-feed multipart fanfold paper 3 to 15 inches wide; 4-part continuous forms acceptable:

NA/NA	2,975	61.00

3250 Document Insertion Device • allows insertion of single sheets or 4-part forms:

NA/NA	105	1.00

5256 Printers • 40- to 120-cps bidirectional 7x8 matrix-impact tabletop printer • 96/188 EBCDIC/ASCII/Multinational character sets • 132 columns at 10 cpi • 6 or 8 lpi • 15-inch tractor feed; 3- to 15-inch continuous or 5.75- to 15-inch precut, 1- to 4-part form paper.

5256 Model 1 Printer • 40 cps:

274/233	3,110	53.00

5256 Model 2 Printer • 80 cps:

310/264	3,255	58.00

5256 Model 3 Printer • 120 cps:

337/287	3,400	66.00

5280 Printer Attachments:

1150 Attachment • allows attachment of up to 7 5224, 5225, and 5256 printers to a single port on the 5285; requires 2680 cable-through feature on all except 5256 • maximum cable length is 5,000 feet:

19/17	540	2.00

1152 Start/Stop Printer Attachment • allows attachment of a 5217 Model C2, 5222 Model 1, or 5242 Model 2 printers to a 5285:

20/18	530	2.00

1155 Attachment • provides single port for attachment of 1 to 7 printers to 5288 in cable-through configuration; up to 6 5224/5256 printers and single 5225 printer may be interfaced • maximum cable length is 5,000 feet • requires 2680 cable-through feature for multiple printer attachment:

19/17	540	2.00

1162 Start/Stop Twinax Printer Attachment • provides single port for attachment of up to 7 printers to 5288 in cable-through configuration; up to 6 5224/5256 printers and a single 5225 printer can be connected • up to 4 5217 Model C2, 5222 Model 1 and/or 5242 Model 2 printers can be attached • requires 2680 cable-through feature for multiple printer attachment to single port:

34/29	925	3.00

2680 Cable-Through • allows multiple 5217C2, 5222, 5224, 5225, 5226, 5242, and 5256 printers to be connected to a single 5288 port via 1162 attachment feature • allows multiple 5224, 5225, and 5256 printers to be connected to a single 5285 port via 1162 attachment feature:

4/3	119	2.00

☐ Other 5280 Peripherals & Attachments

3610 Elapsed Time Counter • real-time counter required for SNA operations and/or for elapsed time measurements if production statistics are to be maintained on 5285/5286/5288

©1985 Data Decisions

IBM 5280 Distributed Data Systems
Models 5285, 5286 & 5288

systems • cannot be used with 4955/4960 elapsed time counter/mag stripe reader attachment features:

$6/$5 mo	$112 prch	$1.00 maint

4950 Magnetic Stripe Reader • provides mag stripe read capability for 128 ABA numeric and control characters encoded on credit or ID cards for 5281/5282 data stations or 5285/5286 programmable units • requires 4955/4960 adapter feature; cannot be used with 3610 counter feature:

19/17	428	2.00

4955 Mag Stripe Reader Adapter/Elapsed Time Counter • provides both mag stripe adapter and real-time counter facilities for 5285/5286/5288 systems • required in lieu of 3610 counter for elapsed time production statistics measurements; required in lieu of 3610 on 5288 for SNA operations • adapter supports up to 4 data station 4950 mag stripe readers • cannot be used with 3610 counter or 4960 adapter/counter:

26/22	642	2.00

4960 Mag Stripe Reader Adapter/Elapsed Time Counter • provides both mag stripe adapter and real-time counter facilities for 5285 system • required in lieu of 3610/4955 counter for both SNA operations and elapsed time production statistics measurements • adapter supports single data station 4950 mag stripe reader • cannot be used with 3610 counter or 4955 adapter/counter:

7/6	256	1.00

6340 Keylock • provides lock/local/normal keylock security for 5285/5288 systems:

43/NA	43	NC

• END

©1985 Data Decisions

IBM 7171
ASCII Device Attachment Control Unit

■ PROFILE

Functions • emulates IBM 3274-1D local cluster controller and 3278/3279/328X terminals and printer • substitutes ASCII terminals/printers/personal computers for emulated IBM units • performs terminal management and control, polling, data concentration, and network control.

Packaging • standalone floorstanding unit attaching up to 64 terminals/printers.

Communications/Networks • interface locally attached or remote terminals at speeds from 300 to 19.2K bps; autobaud detection provided for devices attached directly or through switched/nonswitched networks • controller provides single-link which attaches directly to the block multiplexer channel of a local IBM 308X or H0XX host processor; data transfer rates to 1.23M bps, full-duplex • terminal/printer interface via RS-232C; terminal-host interface via coaxial cable.

First Delivery • 1984.

Systems Delivered • undisclosed.

Comparable Systems • Black Box A/S-3, CCI 8274C, Datastream 700/800, DRA Hydra II, ICOT 35X/36X, Infotron VTS 35X/36X, Innovative Electronics MC80/600/602, Kaufman Data 870/872, Local Data DataLynx 3274, Micom Micro 7400, Protocol Computers 1071/171/71B, Renex RT74, Thomas Engineering MZ-80, etc.

Vendor • International Business Machines (IBM) Corporation, Information Systems Group • National Accounts Division; 1133 Westchester Avenue, White Plains, NY 10604; 914-696-1900 • National Marketing Division; 4111 Northside Parkway, Atlanta, GA 30327; 404-238-2000.

Canadian Distribution • IBM Canada Limited; 3500 Steeles Avenue East, Markham, ON L3R 2Z1 • 416-474-2111.

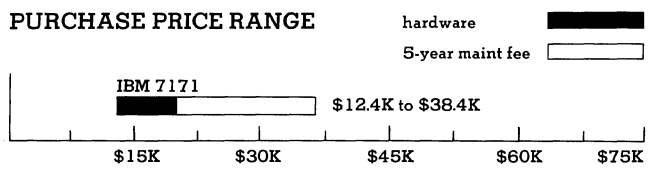
Distribution • sold through IBM sales/service offices worldwide.

GSA Schedule • listed.

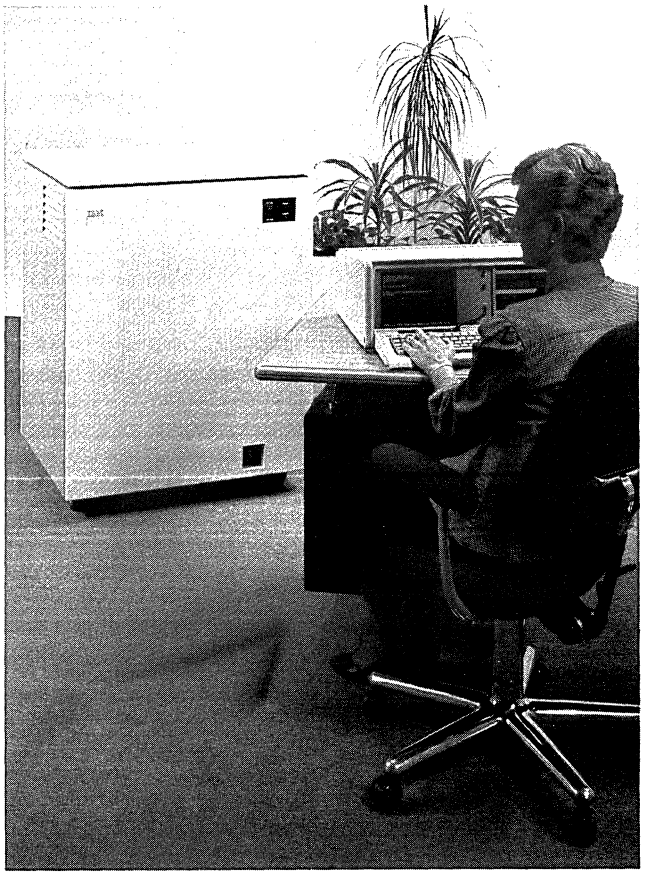
■ ANALYSIS

The 7171 is IBM's third entry in the "protocol converter" marketplace, the others being the 4994 and 7426 (see report 950-I048-7426). Like the earlier products, the 7171 is designed primarily to allow asynchronous ASCII terminals/printers to emulate IBM 3278/3279/3287 units and communicate with IBM host processors. To accomplish this terminal-to-mainframe link, the 7171 also emulates the control characteristics of the IBM 3274-1D, which unit accommodates up to 32 attached terminals/printers, and attaches directly to a local IBM 308X or 43XX host processor.

PURCHASE PRICE RANGE



IBM 7171 PURCHASE PRICING • bar graph covers price range between "small" and "large" configurations of hardware (solid bar) and for associated 5-year maintenance (open bar) • small configuration consists of basic 7171 Model 1 with 16 I/O ports • large configuration consists of basic Model 1 plus three 8-line adapters and three 8-line increments • all prices are single-quantity purchase.



The 7171 emulates an IBM 3274-1D and allows up to 64 asynchronous ASCII terminals/printers to be used in lieu of conventional 3270 devices. While it supports the attachment of PC's, the 7171 does not provide a full transfer facility.

The 7171 will probably replace the 4994 and 7426 Model 1. Both of those are local (to the host) cluster controllers but are limited in type and number of ASCII devices accommodated. The 4994 and 7426, for example, are designed primarily to interface IBM 3101 terminals, although TTY-compatible devices can be accommodated on an RPQ basis. The 4994 handles a substantially larger number of terminals than the 7426—48 versus 4. The 7171 supports 64 terminals/printers from vendors other than IBM.

The 4994 and 7426 also emulate different controllers and interface with different hosts than the 7171. The 4994 emulates the old 3272 local controller and attaches to the S/370 and 43XX. The 7426 emulates the 3276-1 and interfaces with local 43XX and the 8100. The 7171, as mentioned, emulates the 3274-1D and interfaces with a local 308X and 43XX hosts.

The 7171 is strictly a local cluster controller, and for price volume of terminals/printers handled it has no peer. In fact, its 64 I/O ports are double what is offered with any IBM 3270 controller.

©1985 Data Decisions

IBM 7171
ASCII Device Attachment Control Unit

To employ a full compliment of 64 devices, the host control program must be defined as two 3274-1D controllers (see Controllers/Emulators).

With systems like the 7171 and its competitors, users must trade efficiency for the convenience of using an ASCII terminal to emulate a 3278/3279. Any product emulating another has built-in overhead in time and resources to accomplish the conversion. For the IBM products, the emulation and protocol conversion makes any ASCII terminal appear as a 3278/3279, and converts the ASCII character stream into a 3270-like pattern. to emulate the operating characteristics, IBM uses control tables that convert ASCII keyboard commands io 3270 commands. Since the ASCII keyboard probably does not have edit and control keys corresponding to those employed by 3270 keyboards, users must key-in a predetermined set of keystrokes to effect the desired 3270 command. For example, to clear the screen, users press a single key on an IBM keyboard. To accomplish the same thing with an ASCII keyboard, multiple keystrokes (usually 2 or 3) must be entered.

The actual keyboard command emulation is fairly rapid, since the process is executed by software and firmware. The inefficiency is at the operator level. Someone accustomed to using an IBM keyboard must learn a completely new keying pattern; this decreases productivity from reduced keying speeds and keying errors. Even after the operator learns and becomes accustomed to the different patterns, it still requires more time to enter multiple keystrokes.

In summary, products like the 7171 do a commendable job in allowing low-cost, normally incompatible products to replace higher-cost terminals/printers and interface with IBM mainframes. A $500 ASCII terminal, for example, can be used in lieu of a $1,600 IBM Model 3178 or $1,900 Model 3278-2. The 7171 cluster controller also offers a substantial cost break over an IBM 3274-1D—$12,428 versus about $15,000 for a 16-port unit. The 3274-1D price of course is predicated on the ability to find one, since that product has not been in new production for a couple of years.

IBM's strategy for supporting products that impact its mainstream product line is not based on altruism. It's consistent with its plan to increase marketshare at every level of data processing and data communication. To attain its goal, IBM has to expand the compatibility between its components and the outside world, and the gigantic asynchronous ASCII market is a good starting point. Aside from appealing to the conventional dumb terminal segment, the 7171 will also allow the legions of personal computers to tie into IBM mainframes for more sophisticated processing than is now possible. Unfortunately, IBM has chosen not to support a file-transfer facility for the 7171 thus limiting the overall effectiveness of the PC-to-mainframe marriage.

☐ Strengths

The strengths of the 7171 are its extended terminal handling, and its facility to accept remote terminals. With up to 64 I/O ports, a fully configured 7171 provides the equivalent of two 3274-1D controllers in one unit. In addition, each terminal can operate at 19.2K bps which also increases overall throughput. The 7171 employs time-division multiplexing to transmit the data to the host processor, and since the connection is directly to the block multiplexer channel, a data transmit speed of 1.23M bps is possible. This further decreases overall terminal response time.

The remote terminal dial-in facility is not unique (other "protocol" converters have it as well) but it does not exist on the 3270. Remote dial-in allows users to configure specific controller ports to recognize the data transmission rate and character format of a remote terminal dialing into the controller, and establish a session for it. For organizations with remote users requiring only occasional host-processor services, a dial-in facility is a low-cost solution. Without it, the remote site would need its own cluster controller or emulation of it.

Also not supported by the 3270, is a type-ahead feature. A 7171-equipped system is always ready to accept keyboard inputs, and is not limited by an input inhibited (keyboard locked) status of the emulated 3278.

☐ Limitations

As delivered, the 7171 is limited to the attachment of an IBM 3101, Data Media 1520/1521/3045, DEL VT100, LSI ADM3A/ADM31, and Televideo 912/920/950. By contrast, other vendors such as Datastream support **30 or more terminals**. While IBM does permit emulation tables supporting other ASCII terminals to be used, a personal computer is required to define and enter these tables. If a personal computer is not available, the emulation tables can be defined on a machine level—not exactly a simple task.

While the 7171's highlighting is fairly good (e.g., individual characters that have no true attribute bytes can be highlighted, and highlighting is supported on terminals that accept attribute bytes governing the display of characters following them up to the next attribute bytes), terminals that handle both the former (mode) and latter (attribute) highlighting will be limited since these 2 networks cannot be mixed within the same terminal definition table. This is something to consider if you're planning to use a Televideo 950.

As noted earlier, the 7171 also supports attachment of an IBM PC. If you merely wish to have that terminal emulate a 3278, that can be done. If, on the other hand, the application calls for downline/upline loading of files, this is not supported by the 7171. Until recently, such a file transfer capability was not supported by any of the 7171 competitors. Datastream, however, announced the capability for its Model 874, a controller supporting up to 30 terminals. The new file transfer facility works with IBM's TSO and CMS and costs $195.

The 7171 is strictly a single-link controller, attaching to the byte multiplexer channel of the host processor. For added operational flexibility, the controller should have a second link to a remote host—comparable with Lee Data's Models 321 and 421. In this era of distributed processing, a single link is a severe limitation.

■ SOFTWARE

☐ Terms & Support

Terms • firmware and emulation software bundled with basic system price.

Support • bundled with hardware.

■ HARDWARE

☐ Terms & Support

Terms • offered on purchase basis only; term leases and installment payment plans are available.

Support • the IBM 7171 is a Group A Class 3 device, with service provided by IBM Field Engineering under the terms of the maintenance agreement • the 7171 carries a 3-month warranty.

☐ Overview

The IBM 7171 is a terminal/printer cluster controller which emulates an IBM 3274-1D local controller with 3278/3279/3287 terminals/printers attached. The 7171 is delivered with 16 I/O ports with an additional 48 ports being field-installable, bringing the total to 64.

The 7171 supports a single link which attaches to the block multiplexer channel of an IBM 308X and 4300 host processor. Terminals/printers may be directly attached to the 7171, or may access the cluster controller via remote dedicated lines or the commercial dial-up network. Auto baud recognition (ABR) "sets-up" the receiving channel to handle the terminal's speed.

The controller accepts a wide variety of the most popular asynchronous ASCII terminals, and allows them to emulate the display and keyboard facilities of IBM's 3278/3279 terminals and the printer characteristics of the 3287. The emulation software/firmware is contained in "default" tables, but can be changed by the users to reflect difficult devices (see Terminals/Printers).

☐ Converters/Emulators

The IBM 7171 emulates the characteristics of an IBM 3274-1D

 ©1985 Data Decisions

IBM 7171
ASCII Device Attachment Control Unit

local cluster controller plus the display/printer attributes of the 3278/3279/3287 terminals/printers. The basic 7171 is called the Model 1 and is delivered with 16 full-duplex I/O ports. The unit can be expanded to handle up to 64 ports via field-addable 8-line increment modules.

The connection to the host system is through a channel which controls all input and output to the host system. Devices, such as ASCII terminals and printers, do not talk to channels directly but to control units which talk to channels. The input path is then terminal to control unit to channel. Many terminals may be connected to a single control unit and many control units may be connected to a channel. Control units are physically connected in series, one after the other, with special channel cables.

The channel knows what control units are attached to it and what devices are attached to each control unit by Unit Control Words (UCW). UCWs are defined for each channel in the host system.

The addresses defined in the UCW must be the same as the addresses defined in the host control program. If 32 or less addresses are defined for the 7171, the host control program must be defined as a 3274-1D and a shared UCW must be defined. If the 7171 has more than 32 ports, the host control program must be defined as two 3274-1D control units and 2 shared UCWs must be defined to the channel.

The block of addresses to be used to address the attached ASCII devices must be manually set in the 7171. These addresses must be the same as the 3270 addresses specified in the Host System Control Program and in the channel configuration. A switch assembly with 8 on-off switches is provided for this purpose. The first 4 switches define the first address and the last 4 define the last address. The switch assembly is located near and slightly below the center of the channel adapter card. Markings on the switch assembly indicate the On and Off positions. The switch settings establish the first and last addresses of the block of 16, 32, 48, or 64 addresses that will be used to address terminals attached to the 7171 ports. If the number of ports to be supported does not exactly match 1 of these block sizes, the next larger block size should be used.

7171 Model 1 • floorstanding, local cluster controller supporting any combination of up to 16 ASCII terminals and printers • emulates IBM 3274-1D with attached 3278/3279 Model 2 terminals and 3287 printers • RS-232C DTE interface; coaxial interface with host block multiplexer channel • remote dial-in with ABR/character recognition • single high-speed link operating at speeds to 1.23M bps:

$12,428 prch	$245 maint

4002 Eight-Line Addition • allows expansion of port-handling capacity of basic Model 1; provides 8 I/O ports:

1,325	13.50

4000 Eight-Line Increment • allows attachment of 8 ASCII terminals or printers in any combination • used with part 4002 to expand I/O capacity of Model 1:

830	13.50

PRCH: single-unit purchase price. MAINT: monthly maintenance charge. All prices current as of August 1985.

☐ Terminals/Printers

The IBM 7171 is delivered with emulation firmware and software that allows the most commonly available asynchronous ASCII terminals and printers to be substituted for IBM 3278/3278 terminals and 3287 printers. The terminals handled via emulation tables are the IBM 3101 Models 1 and 2 (character mode only); DEC VT100, Data Media 1520/1521/3045, LSI ADM3A/ADM31, and Televideo 912/920/950.

The 7171 also supports a utility diskette that provides a menu-driven method for defining, modifying, and saving ASCII device emulation tables. The utility executes on an IBM Personal Computer with 128K bytes of memory, a monochrome screen, and a 160K-byte diskette drive. If a personal computer is not available, the device definition tables can be defined at the machine level.

The asynchronous terminals themselves must support: point-to-point connection; a 7-bit ASCII code with even parity; full-duplex character mode transmission; absolute cursor positioning; and the ability to clear a screen. The emulator supports 2 types of highlighting. With the first, highlighted fields are supported on terminals that allow individual characters to be highlighted, but which have no true attribute values. For example, the DEC VT100 supports ANSI X3.64 standard for set graphics resolution with parameter 1. The second highlighting scheme works with terminals that accept attribute bytes which govern the display characteristics following them up to the next attribute byte. Terminals which accept attribute bytes but revert to some default display mode at the end of a line are not supported.

Color terminals which operate in ANSI or similar modes can be defined to emulate IBM 3279 basic (4-color) displays. Selection of colors is table-driven and must be coded in the terminal definition table of the terminal. A keyboard sequence allows switching between alternate color selections, or between simple intensity highlighting on 4-color modes. This allows colors to be used only when needed.

ASCII devices having APL capability are supported as emulated IBM 3277's with the Data Analysis, APL feature, or as a 3278 equipped with the Extended Character Set Adapter feature.

The controller also accommodates any serial ASCII printer, and emulates the characteristics of an IBM 3287. The printer operates as a host-addressable unit and can be used for local copy printing.

☐ Communications

The 7171 emulates an IBM 3274-1D local cluster controller, and attaches via coaxial cable to the block multiplexer channel of IBM 308X and 4300 hosts. The 7171 can be located up to 200 linear feet from the host. The 3270 emulation is provided for access to host applications such as CICS, IMS, TSO, or MVS/XA systems, or CMS on VM/SP systems. The controller supports a single-host link and transmits at speeds up to 1.23M bps.

The controller attaches ASCII terminals/printers via an RS-232C interface. The terminals can be directly attached via twisted-wire pairs, up to the limit of the interface (50 feet). In addition, the 7171 also supports remote terminal dial-in whereby a leased line or the DDD can be used to access the controllers. Auto baud recognition (ABR) is employed to allow the controller to automatically "set-up" to handle incoming data. Terminal transmit speeds of 300/600/1200/2400/3600/4800/9600/19200 bps can be accommodated.

• END

©1985 Data Decisions

IBM Device Control/Terminal Interface Units
Models 4994 & 7426

■ PROFILE

Function • emulates IBM 3272/3276-12 controllers and 3277/3278-2 keyboard-displays and 3287 printers • allows ASCII terminals/printers to be substituted for IBM units • performs terminal management and control; performs polling, data concentration, and network control.

Packaging • standalone, tabletop units attaching 16/32/48 (Model 4994) and 4 (Model 7426) terminals/printers.

Communications • supports single high-speed link • direct attachment to IBM 4331, 4341, 4361, 4381, and S/370 block multiplexer channel at 19.2K bps for Model 4994 • Model 7426-1 directly attaches to IBM 8100, 4321, and 4331 via direct attach at speeds to 38.4K bps and data link-attached loop at 9600 bps; Model 7426-1 and 7426-2 remotely attache to S/370, 43XX, 30XX, or 8100 via dedicated or dial-up link at speeds to 9600 bps under SNA/SDLC control • terminal interface to controller via RS-232C or 20-mA current loop on 4994; RS-232C or RS-422 on 7426.

First Delivery • 1983 (7426) and 1984 (4994).

Systems Delivered • undisclosed.

Comparable Systems • Black Box A/S-3, CCI 8274C, Datastream 774/874/776, DRA Hydra II, ICOT 35X/36X, Infotron VTS 351/352, Innovative Electronics MC80/600/602, Kaufman Data 870/872, Local Data Datalynx/3274, Micom Micro 7400, Protocol Computers 1071/171/71B, Renex RT74, Thomas Engineering MZ-80, etc.

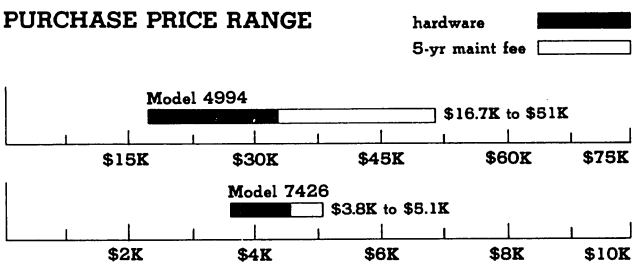
Vendor • International Business Machines (IBM) Corporation, Information Systems Group • National Accounts Division; 1133 Westchester Avenue, White Plains, NY 10604; 914-606-1900 • National Marketing Division; 4111 Northside Parkway, Atlanta, GA 30327; 404-238-2000.

Distribution • worldwide through direct sales offices.

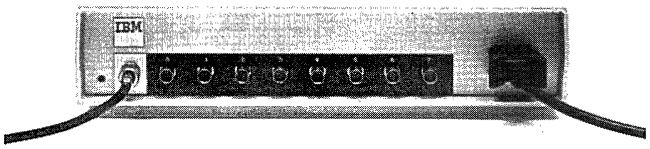
■ ANALYSIS

The 4994 and 7426 are cluster controller and terminal emulators that allow ASCII terminals/printers to communicate with an IBM host mainframe. While designed to accommodate IBM's 3101 Model 1 ASCII terminals and associated 3102 printers, TTY-compatible devices can also be handled on an RPQ basis.

PURCHASE PRICE RANGE



IBM 4994 & 7426 SERIES PURCHASE PRICING bar graph covers price range between "small" and "large" configurations for hardware (solid bars) and for associated 5-year maintenance fees (open bars) • **Model 4994 small** configuration consists of submodel A00 with 16 I/O ports; **large** configuration consists of submodel C00 with 48 I/O ports • **Model 7426 small** configuration consists of Model 2 remote controller with 4 I/O ports; **large** configuration consists of Model 1 local or remote controller with 4 I/O ports • all prices single-quantity purchase.



The 4994 emulates the 3272 controller and 3277-2 keyboard-display, while the 7426 emulates the 3276-12 and 3278-2.

The 4994 is strictly a local cluster controller and attaches directly to an IBM 4331, 4341, 4361, 4381, or S/370. This unit is offered in versions with 16, 32, or 48 I/O ports and accommodates only keyboard displays. The 4994 is somewhat unique in that the terminal emulation services and interactive communication control is handled by the Yale ASCII Communication System, a software package developed by Yale University. This package supports up to 48 full-duplex ASCII terminals and permits interactive communication through TSO and VM/CMS. The terminal control portion of the package is downline loaded from the host into the controller's system RAM. Most competitive devices either load locally or employ ROM or dynamic RAM for control software.

The 7426 is available in versions for local or remote attachment (Model 1) and remote-only attachment (Model 2) to the host processor. Each version supports only 4 terminals/printers, and no expansion I/O ports are offered. This places the IBM product at a decided disadvantage compared with its competition.

Both the 4994 and 7426 support remote terminal dial-in, whereby terminals at remote locations can communicate with the cluster controllers via leased or switched telephone lines. Both cluster controllers also support autobaud (autospeed) and character format recognition, which are definite strong points for the units (see **Strengths**).

The 4994, released in March 1984, appears to be a "stop gap" product due to the old technology and products it supports. The 3272, for example, hasn't been marketed actively for a few years and the 3277-2 falls short on overall capabilities when compared with the 3278-2 and the newer 3178 and 3180. The new IBM 7171, announced this past September, will undoubtedly be the product of choice once it becomes available at the end of this year. The 7171 is a local cluster controller emulating the 3274D, and attaches up to 64 ASCII devices operating at data rates from 300 to 19.2K bps. The 7171 emulates the 3178 and 3278-2 and provides translation tables to accommodate DEC VT100, Lear Siegler ADM 3A/ADM 31, Televideo 912/920/950, Datamedia 1520/1521/3045, and IBM 3101 terminals. The 7171 also accepts ASCII printers and emulates the 328X. The projected price for the basic 7171 is $12,420.

Both the 4994 and 7426 fall behind many competitive products in respect to high-speed link support. Products from Datastream, ICOT, Infotron, Local Data, Micom, Peripheral Technology, Renex, Timeplex, etc, all offer 2 independent links—some with multiple protocol support (see Survey Report 737). Products like

©1984 Data Decisions

IBM Device Control/Terminal Interface Units
Models 4994 & 7426

the ICOT 25X/35X also provide local storage. With a multilink facility, users have the option of establishing separate sessions with independent hosts, and switching between them according to processing needs. This is a definite advantage for the competition (see Limitations).

With systems like the 4994 and 7426 and their competitors, users must trade efficiency for the convenience of using an ASCII terminal to emulate a 3277/3278. Any product emulating another has built-in overhead in time and resources to accomplish the conversion. For the IBM products, the emulation and protocol conversion makes an ASCII terminal appear as a 3277/3278, and converts the ASCII character stream into a 3270-like pattern. To emulate the operating characteristics, IBM uses control tables that convert ASCII keyboard commands into 3270 commands. Since the ASCII keyboard probably does not have edit and control keys corresponding to those employed by 3270 keyboards, users must key-in a predetermined set of keystrokes to effect the desired 3270 command. For example, to clear the screen, users press one key on an IBM keyboard. To accomplish the same thing with an ASCII keyboard, multiple keystrokes (usually 2 or 3) must be entered.

The actual keyboard command emulation is fairly rapid, since the process is executed by firmware. The inefficiency is at the operator level. Someone accustomed to using an IBM keyboard must learn a completely new keying pattern; this decreases productivity from reduced keying speeds and keying errors. Even after the operator learns and becomes accustomed to the different patterns, it still requires more time to enter multiple keystrokes.

In summary, while both IBM products provide the cluster controller and terminal/printer emulation services needed to allow ASCII terminals/printers to communicate with IBM host processors, they fall behind some competitive products in multilink support and local storage. Further, the 4994 is priced **far** above any comparable product on the market; and the 7426 is priced above (but not out of sight) of its competition.

☐ Strengths

The principal strength of the 4994 and 7426 is support for dial-up terminals. In addition to this, the 7426 can locally store frequently used preformatted display information, and the 4994 has extended terminal-handling facilities.

The remote terminal dial-in feature allows users to configure specific controller ports to recognize the data rate and character format of a remote terminal dialing into the controller over the public telephone network, and it establishes a session for it. For organizations with remote users requiring only occasional host-processor services, the dial-in feature is a low-cost solution. Without it, the remote site would need its own cluster controller or a device that emulates it. Remote terminal dial-in, incidentally, is not unique to IBM. The feature is available from virtually all competitors for the 4994 and 7426. The facility, however, is not supported on the IBM 3270 and is a definite weakness of that product line.

The 7426's ability to locally store frequently used preformatted display information increases overall user productivity and decreases overall communication costs. By their ability to access the information locally, users needn't wait for such requests to be serviced by the host processor. And, since no remote communication is involved, the communication overhead and accompanying costs are reduced.

The 4994, a local cluster controller, is offered in versions that support 32 or 48 I/O ports. While a few competitive products support 32 ports, none to our knowledge directly support 48. This extended terminal-handling support could spell the difference between purchasing more than 1 cluster controller to service larger shops. It also focuses the channel monitoring and control operations on a single box.

☐ Limitations

While IBM is ahead of its competitors in port capacity and local storage of preformatted data, it is behind a number of them in multiple data link support and local screen data storage.

The ability to handle multiple data links and, in some cases, different protocols on individual links, adds a high degree of flexibility. With it, the cluster controller can communicate with separate independent hosts or different ports on the same front-end processors. Most of the vendors offering the multilink facility also support concurrent sessions, with session switching executed without logging off. With the ICOT 25X/35X, for example, users can even put a session on hold, switch links to perform another function or retrieve data, and switch back to the on-hold session. Vendors supporting a multilink facility include Analog Precision, Datagram, Datastream, Diversified Data Resources, Gandalf Data, ICOT, Infotron Systems, Local Data, Micom Systems, Renex Corp, Sigma Systems, and Timeplex (see Survey Report 737).

The ICOT 25X and 35X also contain sufficient storage to allow the previously displayed page of each connected terminal to be stored in the cluster controller and recalled via a keyboard command. This is a convenience feature (like the 7426's local storage), which pays dividends in user productivity and reduced communication overhead. While IBM has no such facility either on the 3270 or these 2 cluster emulators, it does provide a 7680-character buffer on the 3180 Model 1 terminal. That device can be used with the 3270, but not the 4994 or 7426, however.

■ SOFTWARE

☐ Terms & Support

Terms • firmware bundled into basic system price.

Support • bundled into hardware.

■ HARDWARE

☐ Terms & Support

Terms • offered on a monthly rental or purchase basis • $64 installation charge for Model 7426.

Support • supported under Representative Service Center and Representative Center Time and Material minimum charge • carry-in service.

☐ Overview

The 4994 and 7426 cluster controllers allow ASCII terminals and printers to connect locally and/or remotely to IBM host mainframes. The 4994 is designed for direct (local) attachment to the 4331, 4341, 4361, 4381, or S/370 block multiplexer channel, and provides 16, 32, or 48 I/O ports to connect ASCII display terminals. The 7426 is offered in versions for direct or remote attachment to the IBM 8100, 4321, and 4331 (Model 1); or remote attachment to S/370, 43XX, 30XX, or 8100 (Model 2). Both versions provide 4 I/O ports, and both accept ASCII display terminals and printers. While the 7426 is designed primarily for connecting IBM 3101 and 3102 terminals and printers, IBM personal computers and TTY-compatible devices are also acceptable (see Communications).

The 4994 and 7426 emulate IBM 3270 cluster controllers, display terminals, and printers. The 4994 emulates the 3272 controller and 3277-2 keyboard-displays; the 7426 emulates the 3276-12 and 3278-2 keyboard-displays. The displays and printers that can be attached (other than the 3101/3102) are defined in terminal definition tables and are downline loaded from the host to the controller. The 4994 runs under the Yale ASCII terminal communications system that provides the terminal emulation facilities and allows interactive communications via TSO and VM/CMS. The 7426 is controlled by downline-loaded microcode.

Terminals can be directly attached to the cluster controllers, or they can connect on a dial-up basis or via leased lines. Both controllers provide facilities for autobaud and auto-character recognition.

The 4994 and 7426 are both furnished with sufficient screen buffer to accommodate 1920 characters per I/O port. No provision is made for local storage of display "pages," as is the case with some competitive products (ICOT 25X, 35X). The 7426, however, does have a 4800-byte system buffer for storing preformatted display information. This capability for storing

 ©1984 Data Decisions

IBM Device Control/Terminal Interface Units
Models 4994 & 7426

frequently used formats reduces the volume of data transfers between the host and 7426.

All versions of the 4994 and 7426 support a single high-speed link to the host processor. In contrast, many competitive products furnish 2 such links. The 4994 directly attaches to the host processor and transmits data at rates to 19.2K bps. The 7426 Model 1, a local or remote controller, attaches directly to the host and transmits at 38.4K bps for direct attachment, and 9600 bps when used in a datalink loop arrangement. The 7426 Model 2 is a remote controller that attaches to the host via a dedicated or dial-up line at speeds to 9600 bps under SNA/SDLC control.

☐ Controllers/Emulators

4994 Model A00 • tabletop, local cluster controller supporting up to 16 ASCII display terminals • emulates IBM 3272 with attached 3277-2 keyboard-display terminals • RS-232C or 20-mA current-loop DTE interface • autobaud and auto-character recognition • 32K-byte RAM screen buffer • single high-speed link; direct attachment to IBM 4331, 4341, 4361, 4381, or S/370:

$897 mo	$16,735 prch	$195 maint

4994 Model B00 • same as A00, except supports up to 32 ASCII display terminals:

1,395	25,850	257

4994 Model C00 • same as A00, except supports up to 48 ASCII display terminals:

1,745	32,300	26

7426 Model 1 • tabletop, local, or remote cluster controller supporting up to 4 ASCII terminals/printers • emulates IBM 3276-12 with attached 3278-2 keyboard-display and/or 3287 printers • converts ASCII code to 3270 message pattern • RS-232C or RS-422 DTE interfaces • autobaud and auto-character recognition • 8K RAM communication buffer; 4800-byte system buffer • single high-speed trunk • attaches to IBM 8100, 4321, or 4331 systems via direct attachment at 38.4K bps, or data link-attached loop at 9600 bps:

NA	4,210	2

7426 Model 2 • tabletop, remote-only cluster controller • all facilities same as Model 1, except attaches to S/370, 43XX, 30XX, or 8100 systems via single high-speed trunk at 9600 bps under SNA/SDLC:

NA	3,830	2

☐ Terminals/Printers

Both the 4994 and 7426 will attach ASCII terminals, allowing them to emulate the display, edit, and control characteristics of the IBM 3277-2 for the 4994 and the 3278-2 for 7426. The 7426 also accepts ASCII printers and emulates the 3287.

The 4994 requires attached terminals to be able to clear the screen or clear to end-of-screen; handles absolute cursor addressing; and ensures that a character written to a screen position replace (not overstrike) the previous character in that position. The 7426 was designed to interface IBM 3101 ASCII terminals and associated 3102 printers, but will also accept IBM personal computers, the 7485-531 RPQ display, 4975-01A printer RPQ DO9033, and certain non-IBM TTY-compatible displays and printers. An RPQ must be submitted for attachment of the TTY-compatible terminals. To attach the IBM personal computer, it must have the 3101 emulation program (6024042) and an asynchronous communication adapter. The emulation tables needed to handle all terminals attached to the 4994 and 7426 are downloaded from the host processor to the cluster controllers.

MO: monthly rental includes maintenance. PRCH: single-quantity purchase price. MAINT: monthly maintenance charge. NA: not available. All prices are current as of November 1984.

☐ Communications

The 4994 controller attaches up to 48 ASCII display terminals via an RS-232C or 20-mA current-loop interface. Data rates for each terminal are program-selectable in 2 jumper-selectable ranges of 37.5 to 1200 bps and 300 to 19,200 bps. Program support for the 4994 is the Host-Loaded Yale ASCII Communications System (5798-RRJ), a program that supports up to 48 full-duplex ASCII devices, and provides the 3277 emulation for the terminals and 3272 controller emulation. The 4994 directly attaches to the IBM 4331, 4341, 4361, 4381, and S/370 block multiplexer channel. Its single link transmits data at 19.2K bps. The Yale Communications System runs under VM/SP Release 2.1 or 3.0 in the host processor, and supports interactive communications through TSO and VM/CMS.

The 7426 controller attaches up to 4 ASCII display terminals or printers via an RS-232C or RS-422 interface. Data rates for each terminal are speeds up to 9600 bps. The 7426 Model 1 is a local or remote cluster controller that attaches to the IBM 8100, 4321, and 4331 systems via direct attachment at speeds up to 38.4K bps, or a remote link-attached loop at speeds to 9600 bps. When connected to the 8100, the 7426 operates under DPPX or DPCX using the same programming support as provided for the 3276-12.

The 7426 Model 2 is a remote cluster controller designed for connection to the S/370, 43XX, 30XX, and 8100 systems. Communication is supported via a single point-to-point or multipoint dedicated or dial-up line at speeds to 9600 bps. Control is under SNA/SDLC.

Operation of both models of the 7426 is dependent on downstream loading of microcode from the host to the controller. Microcode is automatically loaded when the 7426 is powered on.

Both the 4994 and 7426 support remote terminal dial-in with autobaud recognition and auto-character recognition. Remote terminals may access the controllers via leased lines or the direct-dial network.

Both versions of the 7426 can be configured to accommodate the terminal's data rate, parity bits, and character size; loop carrier characteristics can also be entered. The configuring is done by an ASCII terminal attached to the 7426 control port and by pressing an initialization switch on the front panel. The 7426 also has a 4800-byte buffer that is used for storing frequently used preformatted display information. This reduces the volume of communication between the 7426 and host.

• END

 ©1984 Data Decisions

IBM 8100 Information System
Models 8130A, 8130B, 8140A, 8140B, 8140C, 8150A & 8150B

■ PROFILE

Function • distributed processing system; standalone processor or host in network of 8100s • also functions as cluster controller for distributed office, manufacturing system, distributed data processing, and remote job entry environments with programs developed and downline loaded on S/370-compatible host.

Architectures Supported • supports IBM SNA architecture as SDLC or BSC device under either DPCX or DPPX • as SDLC device directly or as an IBM 3791 controller • as BSC device, 8100 looks like an IBM 3271 controller • under DPPX, 8100 can operate as host to network of 8100s or can operate as standalone system.

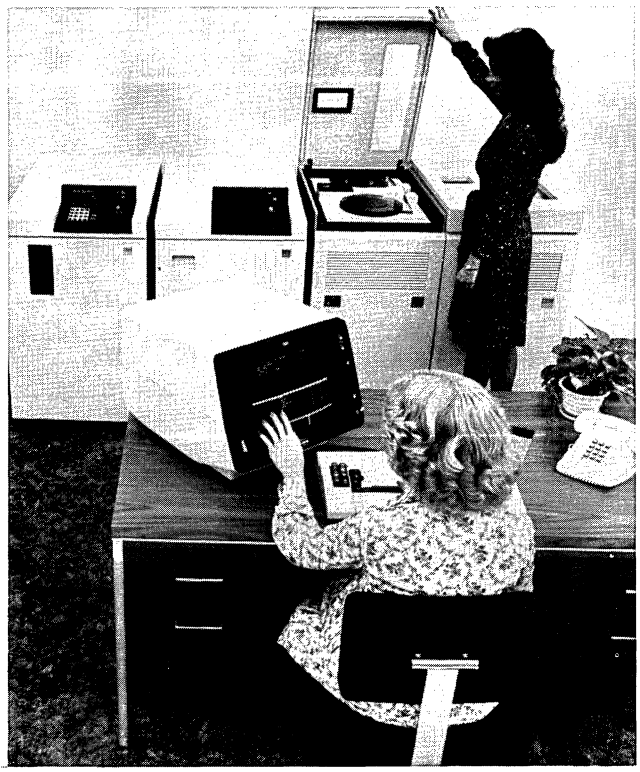
Communications • supports asynchronous and BSC/SDLC synchronous communications through communication ports configured with communication link or local/remote loop: 8130 Models A and B can support up to 14 ports, 8140 A31 through A34 and B51 through B72 19 ports, 8140 A41 through A44 and C72 through C94 up to 18 ports • communication line data rates up to 9600 (BSC) and 56K bps (SDLC); local loop data rates are 9600 or 38,400 bps; remote loop data rates are 2400, 4800, or 9600 bps.

Operating Systems • DPCX is a partially distributed system with program development and program loading performed through the host; replaces and extends host-managed IBM 3790 distributed data processing, IBM 3730 distributed office, and IBM 3630 manufacturing system environments as well as IBM 3270 cluster controller • DPPX/Base provides full-feature distributed processing support with local program development and execution within interactive, multiuser environment; manages 4M-byte virtual address space • DPPX/SP extends Base and provides integrated transaction processing system; supports 8M-byte logical address space on 8130B.

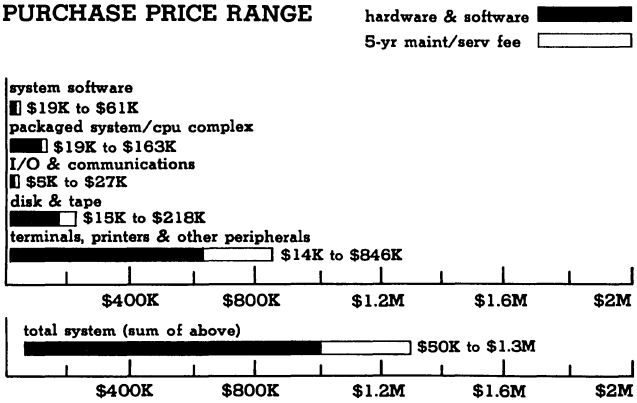
Database Management • DTMS database/transaction management system under DPPX only.

Transaction Processing Management • DPPX/SP provides total local transaction processing environment integrating enhanced DPPX/Base with 10 DPPX licensed programs; under DPPX/Base, requires transaction manager in DPPX/DTMS (Data Base and Transaction Management System) • in 8100 host-controlled environment, local application programs can access remote database/transaction processing through remote DTMS • in IBM S/370-compatible host controlled environment, under DPPX/DPCX (Data Stream Compatibility), 8100 appears as IBM 3270 remote controller giving attached terminals and printer direct access to host and its facilities; application programs running on 8100 can interface to IMS/VS or CICS/VS applications on IBM S/370-compatible host.

Support Software • COBOL, FORTRAN, PL/1, APL, and assembler under DPPX only • application programs to run under DPCX developed on IBM S/370-compatible host and downline loaded in 8100 • DPDS (Distributed Processing Development System) provides development language for system programs for 8100/DPPX systems • Development Management System (DMS)/DPPX and DMS/DPCX provide interactive interfaces for



PURCHASE PRICE RANGE



IBM 8100 PURCHASE PRICING bar graphs illustrate price ranges for small to large systems, with solid bars reflecting software/hardware purchase pricing, and open bars reflecting 5-year service/maintenance fees associated with large system • **SMALL SYSTEM** is based on 8130A **packaged system** (includes CPU, 256K-byte memory, 29M-byte disk storage) and the following options: DPCX operating system and DOSF **systems software**; 6 **I/O and communications** ports; 1 **tape** drive; 4 display **terminals**; and 1 **printer** • **LARGE SYSTEM** is based on 8150 A30 **packaged system** (includes dyadic processor, 6M-byte memory, and 10 I/O and communications ports) and the following options: DPPX/SP **systems software**; BSC, SDLC, and other **I/O and communications** features; 894M-byte **disk** subsystem; 4 **tape** drives; 100 display **terminals**; and 20 **printers**.

 ©1984 Data Decisions

IBM 8100 Information System
Models 8130A, 8130B, 8140A, 8140B, 8140C, 8150A & 8150B

developing application programs easily: DMS/DPPX runs on 8100 under DPPX but can be accessed through terminal at host site; DMS/DPCX runs under control of DOS/VSE, OS/VS1, MVS, or VM/370 on S/370-compatible host.

Processor • systems are based on 8130A/B and 8140A/B single processor or 8140C dual processor with local and remote loops for terminals and peripheral subsystems; 256K- to 1M-byte memory on single 8130A or 8140A/B processor, up to 2M bytes on 8130B and on dual processors; 2M- to 639M-byte disk storage • estimated processor performance in MIPS: 0.15 MIPS for 8130A; 0.23 MIPS for 8130B; 0.25 MIPS for 8140A and B; 0.40 MIPS for 8140C; normalized from 16-bit MIPS ratings of 0.3, 0.5, 0.8 MIPS, respectively, to correspond to 32-bit processors; only 8130B is 32-bit word processor.

Terminals/Workstations • up to 24 (8130A/B) or 48 (8140A/B/C) directly connected local displays and printers; virtually unlimited local and remote displays, teleprinters, printers, card devices through loop and communications links; system resources more limiting than physical connections.

First Delivery • August 1979 (8130A and 8140); June 1982 (8140C dual-processor models); February 1984 (8130B).

Systems Delivered • over 11,000 in U.S. and 23,000 worldwide by September 1984 (estimated).

Comparable Systems • none quite comparable because of its dual role as cluster controller or distributed data processor • some that are in comparable price/power ranges: Data General ECLIPSE, Datapoint ARC processors, Digital Equipment PDP-11, Four-Phase System IV, Hewlett-Packard HP 3000, IBM 4321 and 4331, Sperry V77.

Vendor • International Business Machines, Information Systems Group • National Accounts Division; 1133 Westchester Ave, White Plains, NY 10604; 914-696-1900 • National Marketing Division; 4111 Northside Parkway, Atlanta, GA 30327; 404-238-2000.

Distribution • nationwide network of direct sales/service offices.

■ ANALYSIS

The 8100 system is a small-to-medium, interactive computer applicable to several IBM communications/distributed environments. It economically functions as a replacement for a tightly controlled remote 3270 cluster controller, 3730 office system, 3630 plant communication system, 3790 communications system or as a freestanding system with complete program development and database capabilities. It also functions as a loosely coupled local or remote distributed system communicating with a System/370-compatible host or as an RJE workstation to a System/370-compatible host. The DPCX software supports the 8100 as an upgrade for the 3790 for distributed data processing or for the 3730 for distributed office/document processing in an environment that does not require local trained computer personnel. DPPX software provides a standalone environment for systems that usually require a trained local programming and operating staff, although facilities allow a terminal connected to a remote S/370-compatible host to function as an operator console for the 8100.

Physical facilities for connecting keyboard/displays and printers are overwhelming. Indeed, there is a strong temptation to load the 8100 down with terminals beyond the useful limits of its processing capability. The discrepancy between terminal handling capability and processing power was one factor that led to the introduction of dual-processor 8140C models in July 1981, as well as the recently announced 32-bit 8130B and 8150 dyadic processor models. Database facilities, on the other hand, are modest. This is the opposite of the more powerful System/38, which is a database-oriented system, but with less extensive terminal handling capabilities than the 8100.

In essence, the 8100 is one of IBM's solution to distributed processing and includes some mixing of document/text and data processing. The characteristic usage, regardless of the environment, is mainly interactive. Typically, users will perform many small tasks, such as developing a program module, examining a database segment, and entering a few transactions at a time.

IBM introduced the 8100 system as its key system for a determined thrust into distributed processing. It is a cluster controller that provides the DPCX tightly controlled processing environment that IBM used to call "distributed" but the rest of the industry argued was not sufficiently independent to warrant the name. The DPPX freestanding operating environment supports software extensive enough to satisfy the purest of distributed definitions. IBM has also been developing extensive support of the office environment through the 3730 terminals and DOSF/DISOSS (Distributed Office Support Facility/Distributed Office Support System) software under DPCX, and the factory environment through the 3630 system and 3640 industrial terminals, allowing substantial upward growth possibilities for both types of systems. The acceptance of DOSF/DISOSS has been driven by the fact that these services are offered only on the 8100 in cooperation with a host processor.

For 1979, 1980, and 1981, two-thirds of the 8100s installed were DPCX systems. For 1982, over half of the 8100s installed are DPPX systems. This reflects the maturity of the DPPX software as well as customer understanding of how to use the 8100.

Despite the 8100's label as IBM's primary distributed processing system, it is obvious that IBM has been developing the 4300 to fit that role also. The 4300 has more natural attributes of a distributed processor than the 8100. The 4300 implements the same instruction set as IBM's other S/370-compatible processors (303X and 3081), runs compatible software, and uses the same file structures. Applications programs can be distributed from the host to the 4300.

When the 8100 was first announced, industry forecasters predicted fantastic sales figures, 10s of thousands of systems in the first few years. Those sales never developed, but sales have picked up considerably now that users know what it is and IBM has increased its power albeit modestly. The 8100 is more a cluster controller than a standalone system or distributed processor; it is not really oriented toward standalone operation, and it needs a S/370-compatible host for diagnostics. In the DPCX environment, it depends completely on the S/370-compatible host for software development and program loading. Revenues from the 8100 have grown at an 85 percent compounded annual growth rate, reaching about $600 million in 1982. Last year worldwide sales were 7,000 systems, bringing the installed base to about 15,000 units. This year sales should reach about 12,000 units.

IBM continues to widen the connection capabilities of the 8100 and to improve its ease of use features. The Series/1, 5280, Displaywriter, and the IBM Personal Computer can now connect to both DPPX and DPCX 8100 systems. A user at a terminal connected to 8100 DPPX system can access multiple 8100s and S/370-compatible systems in a network. The DPPX Interactive Productivity Facility has been enhanced with new ease-of-use features. IBM has also increased the 8130's power (by 50 percent as of mid-year 1983) with the 8130B models. More importantly, the 8130B introduces a new 32-bit architecture which is undoubtedly capable of providing the power the 8100 needs. In 1984, IBM announced 2 8150 models: one a single processor while the other features a dyadic processor.

IBM had spent over $0.75 billion on the 8100 development. This kind of investment indicates IBM intends to make the 8100 a major component of the company's SNA/distributed processing environment.

□ Strengths

The 8100's main strength is its ability to accommodate an amazing array of IBM devices either directly or through local/remote loops and communication links. In the DPCX environment, the 8100 operates as a traditional cluster controller. In the DPPX environment, however, IBM offers sophisticated software with database and transaction processing modules. Emphasis is on ease of use and ease of developing application programs for distributed environment.

Both DPPX and DPCX use the same DMS (Development Management System) language for developing applications software for the 8100. DMS/DPPX runs on the 8100 while the DMS/DPCX runs on a S/370-compatible host. Both provide

 ©1984 Data Decisions

IBM 8100 Information System
Models 8130A, 8130B, 8140A, 8140B, 8140C, 8150A & 8150B

self-teaching aids, prompting facilities, program generators, and predefined applications.

IBM also supplies the DPDS (Distributed Processing Development System) for the DPPX environment which provides a development language for system programs for 8100/DPPX. Many other facilities are also offered to aid the user in developing programs for an 8100 in conjunction with application programs used at the host site.

It is clear that the 8100 is a full-fledged component of IBM's System Network Architecture (SNA). IBM has recently upgraded S/38 to operate in a peer-to-peer relationship with S/370-compatible hosts for transaction processing. The 8100 currently does not implement the LU 6.2 architecture for peer-to-peer communication. Under SNA, IBM implements 5 types of nodes: host, transaction processor, communications controller, cluster controller, and terminal. The S/370-compatible processors operate as hosts, S/38 as transaction processors, and the 3705s operate as communications controllers. The 8100 fits the role of cluster controller better than any other IBM system. Although other systems can function as cluster controllers as well as terminals, no other system has the hardware/software facilities to accommodate so many terminals and devices. In addition, the 8100 can now do extensive distributed processing with the performance boast given by the 8140C, 8130B, and 8150A and B. Previously, the processor power seriously limited the amount of independent processing an 8100 could do.

☐ Limitations

The 8100's limitations have been legion since it was first introduced in 1979. In fact, if it had not been introduced by IBM, no one would have taken it seriously as a competitive distributed processing product. It contrasts markedly with the System/38, introduced less than a year later, a truly innovative, well-integrated system that impacted the mid-range processor vendors. The 8100 was underpowered using a mundane 16-bit minicomputer architecture, hard to configure, and available with 2 incompatible operating systems. Since 1979, IBM has poured development funds into the 8100, and slowly but steadily the 8100's weaknesses are being overcome.

The 8100 system has no upward-compatible path. The tightly controlled DPCX operating system cannot move into a freestanding DPPX environment; the operating systems are incompatible, although IBM has been moving them closer together. Similarly, DPPX systems have no compatible upgrade to the S/370 or 4300 environment. According to industry sources, the 8100 sales were impacted because many users developing distributed environments chose the S/370-compatible 4300 rather than the 8100, in spite of the fact that the 4300s have fewer ease-of-use features. The introduction of the packaged 4321 system and remote consoles for the 4300s should curtail further expansion of the 8100 into certain distributed applications. It does not, however, impact the 8100 as a cluster controller.

The second weak link in the 8100 system is its relatively low raw processor speed. Considering the control requirements for managing multiple data streams from many interactive terminals, high-volume activities suffer long response times. It should be pointed out, however, that switching from one environment to another is fast as a result of the 8100's multiple register sets. IBM's first solution for the ceiling on 8100 upward growth was the introduction of dual-processor 8140 models providing 1.6 times the power of single-processor versions. It was not enough power for substantial database transaction processing applications. The 8150B increases performance to about twice that of the 8140C.

The new 32-bit word architecture introduced with the 8130B model and continued with the 8150 has solved some of the 8100's power shortage. The 8150 is still stuck with the 8100's modest (weak) instruction set. The system requires a powerful processor to overcome the instruction set's inherent weakness.

A third weak link in the 8100 system for the office automation environment was the limitation on disk capacity to 600M bytes. This is large for many applications, but providing a centralized information file requires large disks. The 600M-byte disks can store 200,000 to 250,000 pages, equivalent to 10 4-drawer files, not enough for many corporations. The new 8102 I/O and Storage Unit allows connection of 1G bytes of disk storage.

A fourth weak link has been its limited ability to interconnect with other IBM systems, such as the Series/1, S/38, S/34, and 5280. IBM now offers support for connecting Series/1, Displaywriter, Personal Computer, and 5280 to both 8100 DPCX and DPPX systems. Again, IBM spokesmen promise more connectivity enhancements, especially with its banking terminals. Ultimately, IBM will settle many of its interconnection problems with a local area network (LAN) scheme, but that is taking more time than most IBM watchers expected. In the meantime, the 8100 development group continues to improve connectivity through a series of individual software products.

The fifth weak link of the 8100 was that it was hard to configure into an integrated system. The new DPPX/SP software combines the DPPX/Base operating system with 10 program products into a standalone usable system. The only other product needed is a language compiler for program development. Other important features of DPPX/SP include its support of SNA network problem determination facilities.

A sixth weak link of the 8100 was the cost of software license fees. The integration of packages into DPPX/SP plus the introduction of a one-time charge instead of a perpetual monthly license fee has reduced software prices substantially.

■ COMMUNICATIONS FACILITIES OVERVIEW

☐ Distributed Communications

The 8100 functions as a host-controlled cluster controller for many of IBM's terminals, printers, and data entry devices. The 8100 also functions as the host in a point-to-point network of 8100 systems: application-to-application transfer of data records, program-to-remote database/transaction processing, and access to remote command sequences. The 8100 can also operate as an RJE system to an IBM S/370-compatible host. Communication links are primarily SNA/SDLC, but BSC is also supported.

☐ Distributed Configurations

The 8100 supports configurations using 3 processor models, a dual-processor model, and a dyadic processor model. The system memory capacity is now up to 6M bytes and disk storage is now up to 1G bytes. It can attach many devices directly or through remote/local loops or communication links attached to communication ports. Communication ports are provided by the central processor for some models and by up to 4 8101 storage and input/output units for other models. The 8100 provides up to 20 communications ports; each port accommodates a communication link or local/remote loop. Devices can share the local/remote loop to communicate with the 8100. Local loops support aggregate rates of 9600 or 34.6K bps; remote loops support aggregate rates of 2400, 4800, or 9600 bps.

☐ Distributed Communications Utilities

IBM offers a number of products to allow the 8100 to work in a distributed environment with a S/370-compatible host as well as with other 8100s.

DPPX/IPO (Installation Productivity Option) • tailoring aids for customizing a basic pregenerated package for a particular installation.

6001 General Spool File • supports spooling for all applications and attached devices; runs under DPCX operating system; integral to DPCX BASE, Release 3.

DPCX/Host Prep • operates independently on host system to generate services for 8100 running under DPCX.

DMS/DPCX (Development Management System) • runs on S/370-compatible host; used to develop applications programs for 8100 running under DPCX.

HCF (Host Command Facility) for DPPX • runs on S/370-compatible host; provides central-site access from local terminal to 8100 DPPX facilities.

DSX (Distributed Systems Executive) • runs on S/370-compatible host; provides basic library and transfer functions for DPPX and DPCX environments.

 ©1984 Data Decisions

IBM 8100 Information System
Models 8130A, 8130B, 8140A, 8140B, 8140C, 8150A & 8150B

DPDS (Distributed Processing Development System) • for DPPX; language for developing system programs for 8100/DPPX system.

DPPX/RJE • supports remote job entry to S/370-compatible host: BSC communications for multileaving and SNA/SDLC for multiple logical units.

DPCX/DOSF (Distributed Office Support Facility) • supports production and distribution of documents for electronic mail system in conjunction with S/370-compatible host, other 8100s, and 3730 systems.

DPCX/DISOSS (Distributed Office Support System) • runs on 8100; paired with corresponding program running on S/370-compatible host for batch transfer of documents and programs.

DPCX/Document Interchange Facility • runs on 8100; interactive tutorial link to corresponding program on S/370-compatible host for access to document library.

DPCF (Distributed Processing Connection Facility) • FDP; application programs can reside in local 8100 DPPX executing DPCX, remote 8100 DPPX or DPCX, or S/370-compatible host running CICS, IMS, TSO; allows user at terminal logged onto DPPX/DPCF access to multiple applications on other 8100s and S/370-compatible hosts.

■ SOFTWARE

☐ Terms & Support

Terms • terms vary depending on whether the package is designated as a System Control Program (SCP), Program Product (PP), Field Developed Program (FDP), Installed User Program (IUP), or Programming Request for Price Quotation (PRPQ) • SCP, no longer a logical designation for the operating system, is now defined as that portion of the operating systems bundled in the computer system price and incurs no license fee; the remainder of the operating system that incurs a monthly license fee is now designated as PP • most PPs incur a perpetual monthly license fee for each copy; PPs can also have a lower Distributed System License Option (DSLO) for multiple copies; a few of the more recent PPs also incur an initial license charge followed by the perpetual monthly license fee; a lower DSLO initial charge is made for multiple copies • most FDPs, IUPs, and PRPQs have a monthly license fee with a definite time limit (usually 12 or 24 months) after which no additional charges are levied; IBM occasionally supplies "standard" pricing on PRPQs, but most frequently makes individual quotes on inquiry only; a small number of programs in all categories can be purchased for a one-time charge; a small number of recently announced programs requires an initial fee in addition to the monthly license fee.

Support • support/maintenance policies have been in transition for a number of years, and a variety of pricing/support arrangements are in effect, particularly for PP software • the support category A (central and local field engineering service), B (central service), or C (support withdrawn) for older PPs described the type of service bundled in the license fee at no extra charge; the only other alternative was local service at an additional charge • some older PP software licensing includes central service plus either local service (LS) provided by IBM Field Engineering or local assistance (LA) provided by IBM systems engineers until a specified date • since 1979, access to a central database containing information on a large percentage of IBM's installed base is included for the currently supported PP releases at no extra charge, but local program support incurs a monthly charge (MLPSC); in 1980, an additional lower fee (MALPSC) was charged for identical programs at the same site or at those distributed sites which could transmit programs to a central site for local service; in 1981, the price structure was revised to combine the 2 fees into a monthly multiple licensed program support charge (MMLPSC) effective on new orders, but the MALPSC was retained until December 1982 for existing customers; MALPSC is not included in price quotations in this text • FDPs and IUPs are provided on an as-is basis without warranty, but certain programs designated extended support (ES) are provided with central service, usually at no extra charge; FDPs and IUPs are developed by IBM in conjunction with a particular installation; FDPs belong to IBM, whereas IUPs belong to the coauthor/user, but are licensed through IBM • SCPs are divided into 2 classes; designated Class 1 and 2 • Class 1 SCPs include most major operating systems as well as NCP/VS running on IBM 3705; Class 1 SCPs are charged MPSC/MAPSC/MMPSC fees; these correspond to MLPSC/MALPSC/MMLPSC charges, respectively; all SCP charges depend on the processor model category, A, B, or C: Category A includes OS/VSE, OS/VS1 R.7 or VM/370 R.6; Category B includes Category A plus MVS Release 3.8 or MVS corequisite SCP for support of MVS/SP; Category C includes NCP corequisite SCPs and the EP program for the 3704/3705 communications controller products • Class 2 SCPs are completely bundled into the system and incur no separate support charge • the 8100 SCPs all fall into Class 2, and hence incur no extra support charge.

☐ Packaged Software

DPPX/IPO (System Installation Productivity Option) System Package

DPPX/IPO is a comprehensive, integrated, pregenerated basic package and installation aid optionally available to users who buy at least the basic software set. The cost is the sum of the components; there is no extra charge for the tailoring aids included with the pregenerated package. Features for both local site and host installations are included. The basic set of 8100 licensed site application development programs consists of DPPX/BASE, DPPX/DTMS, DPPX/DPS (including IMD); optional software can depend on the different releases. DPPX/IPO also includes instructions for adding required host DSX and HCP and for updating host network definitions associated with ACF/VTAM and ACF/NCP/VS (see additional information following on different releases). DPPX/IPO includes fix packages, documentation catalogs, data sets, I/O customization process (based on tailoring one of several predefined model configurations), installation operations, and administrative guidance.

5750-BA1 DPPX/IPO Release 1 • for the basic software on an 8130 or 8140 processor with 512K-byte memory, 58M-byte disk • can be used to tailor installations including DPPX/DSC and/or DPPX/SORT packages, with 3276-12, 3277-2, 3278-2, 3287-12, 3289-3, 3521, 8775-1, 8775-2, 8809, and/or 3843 devices • available March 1980.

5750-BA1 DPPX/IPO Release 2 • all the capabilities of Release 1 plus DPPX/COBOL Compiler, DPPX COBOL runtime library, and DPPX/RJE • available June 1980.

5750-BA1 DPPX/IPO Release 3 • all the capabilities of Release 2 plus DPPX/IPF and supporting DPPX/BASE Extensions • available December 1980.

5750-BA1 DPPX/IPO Release 3.5 • all of the capabilities of Release 3 plus DPPX/BASE FEP4 package.

5750-BA1 DPPX/IPO Release 5.1 • updated to include DPPX/BASE service-level update 1000 and DPPX/BASE CFE service-level update 0300; other programs updated to current fix package level • last release to DPPX/IPO and service will be withdrawn November 15, 1984; will continue to be provided by IBM Field Engineering under current service practices.

☐ Operating Systems

Two incompatible operating systems are provided for 8100 systems. The Distributed Processing Control Executive (DPCX) allows only partial distribution of processing power in that the computer is at a remote site, but program development and program loading are done by the host rather than by the 8100. The Distributed Processing Programming Executive (DPPX) operating system allows fully distributed operation; both program development and program loading can be done on the 8100, supported by the DMS/DPPX Development Management System, DTMS database/transaction management system, and DXAM access method.

DPCX (Distributed Processing Control Executive)

5761-DS1 DPCX Release 1 • supports an 8100 system as a

 ©1984 Data Decisions

IBM 8100 Information System

Models 8130A, 8130B, 8140A, 8140B, 8140C, 8150A & 8150B

semi-distributed system which is tightly controlled by a S/370-compatible host (including 3030/3081 processors via 370X front ends) or by a 4300; program development and program loading is done through the host, in the manner familiar to users of the 3790; this program product is intended to provide a growth path for users of the 3790 Communications System; existing 3790 programs that run under Configuration 9431, 9165, and 9169 will run unchanged on an 8100 system under DPCX; programs are developed under 3790/DPCX DSE and Host Prep executing on the host, but may be developed at a terminal connected to the 8100; data transfer from a 3790 to an 8100 system is accomplished through transferring definitions from the host over the communications link and transferring the actual data via hand-carried diskettes; most conversions from a 3790 to an 8100 should be relatively easy, but exact configurational support is not maintained from the 3790 to the 8100 • in general an 8130-based DPCX system should execute somewhat faster than a 3790, trading a significant improvement in disk performance (IBM estimates a factor of 2 as "typical") for a slightly slower processor; a single-processor 8140-based DPCX system provides about 40 percent more processing capabilities with the same disk performance improvements • Release 1.4 provides support for 1M bytes of main memory, 8140-B processors, 516M bytes of disk, 3262 printers, 3274-51C display control unit, double-precision arithmetic, and enhanced DXAM disk access features • Release 1.4 has been available as of November 1980 • support for DPCX Release 1 will continue until early 1982.

5761-DS1 DPCX Release 2 • supports 3732, 3736, and 6670 devices, thus providing growth path for 3730 distributed office system; • supports directly attached 3732 text displays and 3736 letter-quality printers and loop-attached 3262-2/12 band printers with 128-character band (via spool feature 6001); includes 3270 Data Stream Capability and RJE capability; supports up to 31 concurrent applications; this release includes performance enhancements over Release 1 for improved handling of memory for symbolic machines (emulated 3790/3730 applications) and reduced disk movement through user control of memory assignment and disk space allocation; transient loading is also improved by eliminating index access • supports SNA/SDLC host link at up to 56K bps; host support under DOS/VS, DOS/VSE, OS/VS1, and OS/VS2(MVS); connection to IMS/VS, CICS/VS, TSO (DSC), and VSPC (DSC) supported • document creation, manipulation, and editing supported under DOSF • IBM indicates typical performance of 8130 DPCX systems (including 768K bytes or more memory and using DOSF) to be from 1.0 to 1.5 times that of the 3730; of similarly configured 8140 systems, from 1.4 to 2.5 times that of the 3730 (the 3730 is based on 3790 controller) • supports maximum 8130/8140 memory, disk, and tape configurations, 1 host link, 24 directly attached displays and printers, 5 remote loops, and 3 local loops; maximum of 40 devices per remote loop, 41 devices per local loop • available May 1981.

DPCX Release 2.2 • together with feature 6001, will support 5210-E1 and -E2 correspondence-quality printer, the 3732 or 8775 IDTF program product, and downstream loading of the 8775, in a DOSF/DPCX environment (see Office Automation for DOSF) • supports IBM Series/1 attachment via Series/1 3270 emulation • supports IBM 8140 Processor Models C72, C82, and C92 in single-processor mode.

6001 General Spool File • feature of DPCX 2.2 and 3 • spooling function for all applications and all attached displays and printers including 3736 and 6670; browsing function, without modification capability, is supported for all displays attached, vertical and horizontal scrolling, document access by page number, and character string search supported • usable with DOSF generated documents or data generated by any 8100 application • as of May 1, 1983 the 6001 feature will be included in the charge for all releases of DPCX BASE.

5761-DS1 DPCX BASE Before May 1, 1983 • requires Feature #6001:

NA/NA initl	$85/$64 mo	NA/NA OTC $10/$16 serv

5761-DS1 DPCX Release 3 • supports 8140 Models C72, C82, and C92; provides DPCX and DOSF users with increased storage and performance available with 8140 Model C processor: up to 2M-byte processor storage; up to 4M-byte logical storage; increased throughput of 60 percent over 8140 Model B; support of up to 62 active user tasks and up to 62 terminals; supports up to 62 host sessions in which application programs and/or DPCX services can be sending/receiving data to/from host; SYSCONFG allows user to select either previously supported 31 active tasks or new maximum of 62 tasks and to control allocation/deallocation of disk storage required for 62 task system support • supports attachment of IBM Displaywriter operating in Displaywriter 3270 data stream compatibility mode • upward compatible with DPCX Releases 2, 2.1, and 2.2; supports latest version of DOSF • enhancements available April 1983; 5761-DS1 DPCX BASE after May 1, 1983.

5761-DS1 DPCX Release 4 • extends support to 8130B and 8150B processors • for 8150B, support is limited to I/O on a single processor; DASD, communication ports, display/printer adapters, and device remain unchanged from DPCX Release 3; and 8150 keys and locks are not supported • new Data Stream Compatibility-Extended (DSC-E) facility provides suspend/resume hot key switch and a user exit capability; always makes 2 user tasks active; can be initiated from any DPCX/DOSF display (except 3732); cannot be initiated from host; supports local copy on 8775 if printer adapter feature (5580) is installed • command interface for DSC and DSC-E • increases number of user data sets from 96 to 191 and system data sets from 32 to 64 • enhanced network management for problem determination aid, error log summary and analysis, network installation management, and system and data link traces • connectivity enhancements include extension of Bulk Print to include 5210 Printer Models E1 and E2, host applications can use this printer as an SNA Character Stream (SCS) LU Type 1; Displaywriter can connect to 8100 through Display Printer Adapter with it appearing as 3277 Display Station or can connect to 3274 controller, which connects to 8100 local or remote loop or 8100 Data Link Adapter; Displaywriter appears to be a 3278 Display Station and Displaywriter printer appears as a 3287 printer; these attachments provide document interchange with DPCX/DOSF • usability improvements allow DPCX and DOSF users to assign specific functions to Program Function and PA keys and provide new control operator functions • Reliability, Availability, and Serviceability improvements, problem determination, and fix verification • Installation Enhancements for save and restore and system configuration facilities:

NA/NA	442/376	6,900/5,865 101/161

5748-XC4 DMS/DPCX (Development Management System) • program product that runs on host 370/303X/3081/4300 system with CICS/VS, TSO, or VM/370 (CMS); provides additional applications development for 8100/DPCX systems and a measure of compatibility (via application specifications and files) with 8100/DPPX systems; provides essentially the same capabilities as DMS/DPPX; basic DMS available December 1980; CICS support available February 1981; 3732/3736 with spooled printing support June 1981:

NA/NA	817/612	NA/NA 94/151

5798-DAF 8100/DPCX/3790 Sort/Merge • provides general sort/merge capabilities for 8100 DPCX and 3790 users suitable for interactive environments; 5 to 20 times faster than previous 3790 programs; sorts tags in descending or ascending order, builds tag data set based on up to 16 fields, can resequence

INITL: first figure is initial one-time license fee; second figure is initial license fee for distributed system (DSLO). MO: first figure is monthly license charge for primary system; second figure is monthly license charge for distributed operation (DSLO). OTC: first figure is one-time charge for license fee rather than monthly rate for single system; second figure is one-time charge for distributed system operation (DSLO). SERV: first figure is separate monthly support (MLPSC) for a single system; second figure is monthly multiple license program support charge (MMLPSC), a single charge combining support for 2 systems. NA: not available. NC: no charge (service bundled in license fee). Prices effective as of August 1984 unless otherwise indicated.

 ©1984 Data Decisions

IBM 8100 Information System

Models 8130A, 8130B, 8140A, 8140B, 8140C, 8150A & 8150B

original input record; an FDP written in 3790 Macro; available September 1971; licensing fee is charged for 12 months:

NA/NA	**35/NA**	**NA/NA**
		NC/NA

5798-CZE 8100/DPCX/3790 Distributed Entry/Query System • provides data processing facilities for generating and maintaining local data files and for producing reports for daily operational needs; an FDP written in assembler; available 1979; licensing fee is charged for 12 months:

NA/NA	**190/NA**	**NA/NA**
		NC/NA

DPPX (Distributed Processing Programming Executive)

A generic name for the support of freestanding or distributed environments for the 8100; the central BASE element is required for the other support elements, which include language processors (assembly, FORTRAN, and COBOL), applications development (DMS and DPS), database management and transaction processing (DTMS), several packages for specific tasks (SORT, RJE, and DSC for 3270 "pass-through" communication), PT for monitoring and reporting system operation and utilization, and GEN 3644 for development of programs using 3630 Plant Communication system.

IBM now offers the DPPX/System Product (DPPX/SP), which combines and enhances the functions in the DPPX/Base functional enhancement package 6 (FEP 6) and 10 additional DPPX programs. DPPX/SP is a transaction-oriented system product that has been tested as a unit. It is user oriented and designed to make it easy to install, customize, and maintain the system.

IBM will develop future enhancements for distributed data processing for DPPX/SP, DPPX/Base, and the associated separately licensed programs that have counterparts in DPPX/SP. These programs will be maintained at current user levels.

5660-281 DPPX/SP Release 1 • a single transaction-oriented system that includes enhanced versions of **DPPX/Base FEP 6**, **Command Facility Extensions (CFE) feature**, **Interactive Productivity Facility. (IPF)**, **Data Stream Compatibility (DSC)**, **Database and Transaction Management System (DTMS)**, **Sort**, **COBOL Library**, **Programmed Operator Facility (POF)**, **Problem Determination Application (PDA)**, **Remote Job Entry (RJE)**, and **Format Management (FM)** • supports 8130 and 8140 configurations including new 8100B, 3290 Information Panel, 3178 Display, 5210 Models E01/E02/G01/G02, 3274-41C/61C Control Unit, and 3270 PC • performance is increased, new features provided, user interface improved, functions broadened, and network and system management enhanced • new features include network management facilities to improve problem determination on communication links and a new Router to provide access from a terminal to multiple applications located anywhere on the network • improved user facilities center around ease of use: menu-driven system functions, hardware definition, activation, testing, improved system messages, and integrated system for distributed processing and application development • function enhancements to connectivity with special subsystems such as Displaywriter and DPPX/DPCX-attached devices, printer sharing, DTMS, HTF, FM, and an option for unattended RJE operation • improved performance results from DASD cache support, self-tuning buffers, SAVE/RESTORE IPL, larger maximum request unit for RJE and Host Data Transfer, reduction in disk I/O required to load application programs and maps, improved user library, and Programmed Communications feature for BSC links • enhanced system and network management provided for LPDA, system trace, formattted dump, PDA naming, error log summary and archive (ELSA), error recovery procedure, and clear error log facility • LPDA support allows 8100 systems to collect problem determination information from their downstream data networks, enter the information in an error log, and access it from 8100 or from central host through HCF • New Router allows display operator to communicate with multiple applications in other nodes without extra logons and logoffs; operator interface is menu-driven, allowing operation to switch from one application to another, residing in local or remote DPPX/SP host system; Router can operate in passthrough mode comparable to DSC/Co-Domain Pass-Through (CDP); can coexist with Distributed Processing Connection Facility (DPCF) on system but Router provides more facilities • DASD cache support will provide most performance improvement for 8130B and 8140C users, from 20 to 80 percent reduction in disk I/Os; 8130A and 8140A and B users may experience no performance improvement • the self-tuning buffers expand and contract in response to demand to optimize performance • the performance improvement using the router depends on the message rate of terminals using it and the message size; at 1800 messages per hour and a message size less than or equal to 1 RU, the 8140B processor utilization is improved by 4 percent; router passthrough performance is equal to DSC/CDP for host sessions • 8130B models provide at least 50 percent more throughput than 8130A models for equivalent response times; may be greater if CPU utilization and storage space constrained on 8130A • requires IBM 3104, 3276, or 8775 display terminal or 3274 control unit with display attached through loop or with directly attached 3277, 512K-byte memory (minimum) or 768K-byte memory (providing new functions such as Router) • software is self-contained executable system; requires programming language for program development • up to 25 percent real storage on any 8100 can be allocated for DASD cache buffer • requires 30M bytes of disk storage for system catalog and 12M bytes for user catalog • supports the following application programming languages and tools: DMS/DPPX (5760-XC2), DMS/DPPX Execution Facility (5660-265), DPPX COBOL Compiler (5760-CB1), DPPX FORTRAN Compiler (5760-F01), DPPX FORTRAN Library (5760-LM1), DPPX PL/1 Compiler (5760-PL1), DPPX PL/1 Library (5760-LM2), DPPX Assembler (5760-AS1), DPPX APL (5760-XR2) • provides following application support: DCMS/DPPX (5760-XR6), DPPX/SP IMD (5660-282), DPPX GEN 3644 (5760-ED1), DPPX PT (5760-XR5), DPPX/PS 3640 (5660-267), DPS Version 1 IMD Feature (5760-XR1) for migration only, and DPS Version 2 IMD Feature (5660-264) for migration only • supports the following network management programs running on a S/370-compatible host: DSX Version 1.2.2 (5748-XXG), DSX Version 2 (5668-986), HCF Version 1 (5735-XR1), and HCF Version 2 (5668-985) • supports the following PRPQs: SDLC Auto Answer (5799-BDE) and 3277 Graphics Attachment (5799-BAQ) • supports following programs in the same way as DPPX/Base: COBOL Application Cross Reference (5798-DDJ), COBOL Application Integrity Monitor (5798-DGZ), Communication Design Aid (5796-PNL), COPICS Host Interface (5798-DFR), COPICS Plant Monitor (5798-DFT), Data Compression-Host (5798-DJL), Data Compression-Controller (5798-DJN), Distributed Document Formatting Facility (5785-RAA), Distributed Plant Maintenance (5787-GAA), Distributed Processing Connection Facility (5798-DKX), DMS Management Aid (5798-DHH), DTMS Segmented Access Method (5796-DCG), DTMS Transaction Simulation (5798-DDP), Extended Debug Facility (5785-ECA), File Print Utility (5798-DGG), Interactive Database Transaction Program (5796-PNR), Interactive Processing of Data and Text (5785-DDK), Mortgage Banking System (5798-DDN), Order Entry Using DMS (5798-DEZ), Pattern Letter Generator (5798-DHP), Payroll Management System (5798-DDD), Peer Data Transfer (5798-DWJ), Power Plant Maintenance (5798-DED), Retail Merchandise Ticketing (5796-BCA), Spooled Output Transcription Program (5798-DHW), Virtual Terminal Access Facility (5798-DFF), 3640 Device Support Programs (5798-DEJ), 3640 Data Collection/Lot Tracking (5798-DFG), and 3640 Shop Floor Control (5796-BBR) • available for both new users and upgrading 8100 installations; new users receive dump/restore/tapes or a complete disk initialization diskette; DPPX/Base users will also receive an initialization diskette to operate in update installation mode • performance will generally be that of DPPX/Base FEP6; if new features such as DASD cache and Router are used on certain systems, performance will be considerably improved • available October 1983.

5660-281 DPPX/SP Release 2 • provides significant enhancements over Release 1: new hardware support, enhanced database support, new multiple batch capability, new and enhanced software functions • new hardware support includes 8150 processor as well as 8130 and 8140, keys and locks memory management, and higher availability; supports up to 6M bytes of real storage and 16M bytes of logical storage, dual processing control element, and Common Address Space Section

 ©1984 Data Decisions

IBM 8100 Information System
Models 8130A, 8130B, 8140A, 8140B, 8140C, 8150A & 8150B

(CASS) • enhanced database support provides shadow file facility for data backup, improved system availability through enhanced DXAM file management combined with shadow file facility, and multiple batch capability for up to 16 batch job environments • new and enhanced software functions include extension of printer sharing to support IBM 5210 Models E1 and E2; router function increased to support IBM Displaywriter and Scanmaster, which can use 8100 passthrough facility to access a host system, particularly DISOSS, resolution of different Request Unit (RU) sizes automatically, and BSC to systems network architecture portion of DSC; DPPX/PT Version 2, Host Transaction Facility (HTF) improvements for HTF Direct, and enhanced LPDA to provide alert to host system • performance is equivalent to DPPX/SP Release 1, but CASS can improve performance over Release 1 through new memory management; also multiple batch environments can improve performance on 8140C and 8150 • requires 30K bytes more processor storage; each batch environment stored requires increased storage; shadow file facility requires additional storage of 16K bytes for normal operation and 46K bytes during activation for first source and shadow volume pair and 2K/26K bytes for each additional pair • Release 2 requires 32M bytes of disk storage of system catalog space and 10M bytes of catalog space for customer usage • upward compatible with Release 1 • available June 1984:

NC/NA initl	**$813/$690 mo**	**$19,600/$16,660 OTC**
		$284/$454 serv

5660-282 DPPX/SP Interactive Map Development (IMD) • new program designed specifically for DPPX/SP to generate mapgroups exploiting enhanced functions by the DPPX/SP Format Management Component • all future DPPX map generation enhancements will be to this program; DPS IMD Versions 1 and 2 will be maintained at current levels • new functions include greater device size independence, improved mapgroup test, map specification concatenation and sharing, mapgroup generator, improved load module support, and 3290 Information Panel support • runs under DPPX/SP; requires development language compiler to create applications using IMD through FM components of DPPX/SP • upward compatible with IMD Feature of DPS Versions 1 and 2 • available October 1983:

NC/NC	**199/169**	**5,300/4,500**
		19/30

5760-010 DPPX/BASE • multiprogramming, multiuser executive provides support within a virtual space of 4M bytes • supports a distributed network in which the 8100 communicates with a S/370-compatible host (including 303X and 4300 systems), a distributed network in which an 8100 is the host for other 8100s, a freestanding multiuser 8100 system, and combinations of these environments simultaneously; in general, the user interface to 8100 activities can be interactive from any connected keyboard/display or keyboard/printer (controlled access via priority password security arrangements); job stream control via pre-stored command sequences entered via a card reader, disk, or tape, or command sequence entry via an applications program call • specific support for a freestanding environment includes database/transaction processing (DTMS), program development for assembly language, COBOL, and FORTRAN programs, interactive control of all system activities, batched command sequences, and interactive applications processing • only RSDS (Relative Sequential Data Set) data organization is supported; access to data is sequential from all devices, relative sequential (RSAM) by record or block number from disk and diskette storage, and indexed from disk and diskette storage; indexed access provides up to 8 independent keys for each record/block; keys are maintained in a separate data set • see Communications/Networks for distributed support • BASE will run in a minimum 8130/8140 system that includes at least 1 loop-connected 3276 or 8775 display terminal and 1 printer; only assembly language programming is supported in this minimum environment; additional disk storage and main memory are required to support other programming facilities • Functional Enhancement Package 3 (FEP3) includes updates with performance enhancements, shared buffers, DXAM buffer, and display commands, available September 1980 • FEP4 includes split index improvements, more display commands, and updated host transaction facility functions, available February 1981 • FEP5 includes data queuing, updated printer sharing, available March 1981 • FEP6 includes support for 8140C dual-processor models, the X.21 standard communication interface, switched or leased upstream and leased downstream lines; performance usuability, serviceability, and availability enhancements, printer sharing; and enhanced connectivity to Series/1 3640 Plant Communication System, Displaywriter, and 5280 Distributed Data System • supports attachment of Series/1 directly or through nonswitched line to SDLC adapter; supports up to 8 addressable SNA LUs (logical units) from Series/1 Types 1, 2, and 3, and up to 10 RUs (request units); requires Series/1 to run under RPS Version 5 with MTM Version 2 and SNA Extended Support or EDX Version 3.2 with EDX SNA support and EDX Communication Facility; requires DPPX BASE FEP6; DPPX DSC for subsystems requiring passthrough communication to host • supports 3640 Plant Communication System host with DPPX DSC, which can communicate with 3640 transactions in S/370-compatible host (no additional programming) • supports attachment of IBM Displaywriter operating in Displaywriter 3270 data stream compatibility mode; attachment supports SNA request unit sizes up to 1024 bytes, SNA logical unit Type 2, screen sizes of 1920, 2560, and 3440 characters, and local copy/print • supports attachment of the 5280 Distributed Data System through non-switched line to SDLC adapter on the 8100; appears as 3274 controller with 3278 display and a 3287 Model 1 or 2 printer; 5280 devices access DPPX BASE FEP6 including DTMS, ICF, and DSC; through use of 8100 DPPX DSC, 5280 can function as 3270 terminal on S/370-compatible host; requires communication utilities and 3270 Emulation on 5280; provides printer support • FEP6 allows a DPPX-attached 8775 to access DOSF on an attached 8100 DPCX system; requires DPPX Data Stream Compatibility (DSC) and the Interactive Display Text Facility (DTF) on 8775; up to 8 IBM 8775 displays can be addressed via each communication port connected to DPCX DOSF system; allows single terminal to be used as DPPX data terminal and an occasional text terminal to DOSF under DPCX • FEP6 available September 1982:

NC/NC	**314/267**	**8,400/7,140**
		155/248

5660-264 8100 DPPX/DPS Version 2 • ease-of-use aid for programmers of DPPX/BASE in design, implementation, testing, and maintenance; Format Management (FM) runtime component can be invoked from applications programs • Interactive Map Definition (IMD) is optional feature; upward compatible with Version 1; part of the DPPX/IPO (5750-BA1):

NC/NA	**180/135**	**1,900/1,615**
		15/23

Format Management (FM) Feature • runtime component of DPPX/DPS:

NC/NA	**70/59**	**NA/NA**
		17/27

Interactive Map Definition (IMD) Feature • allows programmer to describe online DPPX display devices interfaces to the end user:

NC/NA	**199/169**	**NA/NA**
		19/30

5760-010 DPPX BASE Command Facility Extensions Feature • provides support for DPPX Interactive Productivity Facility (IPF); logic control, accessing and displaying menus, data entry, and tutorial panels for IPF:

NC/NC	**24/20**	**680/578**
		10/16

5660-272 DPPX Problem Determination Aid • resides in 8100 and operates in conjunction with Network Problem Determination Application (NPDA) Version 2 running on S/370-compatible host under MVS, VS1, or VSE; assists users to perform problem determination at S/370-compatible host processor • DPPX BASE requires PTF UF02852 fix:

NC/NC	**32/26**	**880/748**
		10/16

5660-273 DPPX Programmed Operator Facility • provides ability to service messages for system operator with programmed responses; designed to allow use of 8100 at a remote site • requires same 8100 hardware configuration as DPPX/BASE with minimum 512K-byte memory • requires DPPX/DTMS and/or

 ©1984 Data Decisions

IBM 8100 Information System
Models 8130A, 8130B, 8140A, 8140B, 8140C, 8150A & 8150B

DPPX/DPS-V2:

NC/NC	NA/NA	580/493
		6/10

5785-DEN IBM 8100/DPPX Shadow File Manager • provides DPPX/SP Release 1 and DPPX/FEP 6, the functional equivalence of the Shadow File Manager available in DPPX/SP Release 2 • available October 1983:

NC/NA	NA/NA	600/NA
		NA/NA

☐ Host Facilities

IBM provides a number of facilities on its host mainframes to support the 8100.

5668-944 Cross System Product/Application Development Release 1.1 • allows generation of applications for DPPX/SP execution on 4300 or 3000 Series Processors under 5668-945 or on 8100 under 5660-285:

$960/$720 initl	$185/$140 mo	NA/NA OTC
		$32/$51 serv

5668-945 Cross System Product/Application Execution Release 1.1 • allows execution of applications generated by 5668-944 on 4300 or 3000 Series Processors:

720/540	140/105	NA/NA
		22/35

5735-XR1 HCF (Host Command Facility) for DPPX & DPCX • runs under DOS/VS, DOS/VSE, OS/VS1 (with VTAM, ACF/VTAM, ACF/TCAM, or TCAM-10), or OS/VS2 (ACF/VTAM, ACF/TCAM, or TCAM-10); provides access from a terminal connected to a S/370-compatible host to the complete interactive command facility in DPPX and DPCX • DPPX HCF provides access to DTMS commands for initiation/termination of work, reconfiguration, and any other 8100 function; provides central-site problem determination and program development; supports SDLC links to 8100 and BSC, SDLC, and local attachment of displays; DPPX/BASE is required • DPCX HCF provides remote control and operation of single 8100 DPCX system, remote problem determination and isolation, and remote system performance control • MVS and VS1 VTAM available January 1980; DOS/VS, VS1, and MVS TCAM available March 1980; DOS/VSE available June 1980:

NC/NC	120/90	NA/NA
		33/53

5735-XR3 DPCX/Host Prep R.5 & 6 • for 8100/DPCS and DOSF • runs on IBM S/370, 30XX, and 4300 processors with minimum of 1M bytes of memory; operating system can be OS/VS1, MVS/370, MVS/XA, or VSE; access method support includes ACF/VTAM V1R2/V1R3/V2, ACF/TCAM V1/V2R2/V2R3, ACF/VTAME, VSAM, QSAM, VTAM Level 2.0, or TCAM Release 10:

NA/NA	234/175	NA/NA
		74/118

IR12 Host Support • for 8100/DPCX, 3790, 3770, and 3780; correspond to 5735-XR3; available April 1980 • no charge.

5668-985 Host Command Facility (HCF) V2 • runs under MVX R3.8 with ACF/VTAM; operates in conjunction with the Terminal Access Facility Feature of the Network Communications Control Facility Release 2 (NCCF-R2) • allows operator at System/370 or 4300 site to monitor/control multiple 8100 DPX systems concurrently; also allows access to 1 DPCX system at a time from NCCF terminal:

NC/NC	188/140	NA/NA
		38/61

5796-BCQ 8100 Segmented Access Method (SAM) • allows storing and retrieving segments of various lengths into a single DTMS database with COBOL or DMS programs; direct or sequential access; access method written in assembler; code is reentrant • central service availability until December 3, 1982; license fee is charged for 12 months:

NC/NC	270/NA	NA/NA
		NC/NA

5748-XXG DSX (Distributed Systems Executive) • runs on S/370-compatible host; provides DPPX and DPCX environments with basic library and transfer functions for programs, data sets, and command lists; runs under DOS/VS, OS/VS1, and OS/VS2(MVS) • now superseded by 5668-986 but Release 2.2 will continue to be supported until September 1984:

NC/NC	235/177	NA/NA
		41/65

5668-986 Distributed System Executive, Version 2, Release 2 (DSX V2.2) • enhanced version that supports IBM Series/1 processors under RPS, EDX, and CPS and IBM 8100 for all functions and file structures available under DPCX Release 2.2 and 3 • DPCX extended support includes DXAM files, subcategory definitions, system and configuration data sets, and procedures and commands • continues DPPX and 379 support • runs on S/370-compatible host running under MVS (including XA), OS/VS1, and DOS/VSE with appropriate version of VTAM, VTAME, TCAM, or VSAM • requires DPPX with FEP6 or subsequent service level, DPCX Release 2.2 or 3 or subsequent service level • available under MVS September 1983 and under DOS/VSE December 1983:

1,220/915	407/305	NA/NA
		44/69

5799-AZL DPDS (Distributed Processing Development System) for DPPX • provides development language for system programs for 8100/DPPX systems; runs under OS/VS1 or OS/VS2(MVS) • includes HTF macros in the PL/DS (programming language for distributed systems) macro library, available August 1980 • program number of 5799-AZL associated with programming RPQ P88016:

NC/NC	632/NA	NA/NA
		NC/NA

8100 COBOL Host Development & Test System for DPPX • for starting development before an 8100 is installed or increasing capacity; available November 1980.

5785-DCF TSO/MVS • runs under MVS:

NC/NC	NA/NA	4,000/NA
		NA/NA

5785-DCG TSO/CMS • runs under CMS:

NC/NC	NA/NA	3,500/NA
		NA/NA

☐ Database Management

5760-TD1 DPPX/DTMS (Data Base & Transaction Management System) • 2 modules (Data Base Manager and Transaction Manager) are usable separately or together to create, maintain and inquire databases and to perform transaction-oriented processing • a database is a specifically defined group of data sets accessible through the DXAM indexed access method; specific facilities are provided to control access to multiple databases from multiple application programs written in COBOL, assembly language, or FORTRAN (requires assembly language subroutines); logging/journaling to disk, diskette, or tape provided for backup/recovery; aborted updates can be backed out to restore the database to the condition prior to that update; user identification, password, and authorization categories are provided to control access to data; existing indexed access data sets can be placed under DTMS control easily; system generation is not required to activate DTMS initially • transaction management separates the application program request for processing from the actual processing; database or non-database-oriented application programs can request transaction service and the terminal/application is freed as soon as the request is entered; DPS can be used to simplify display screen formatting • DTMS supports keyboard/displays-keyboard/printers and printers • Functional Enhancement Package 1 (FEP1) includes fully qualified data set names, reload-to-different-volumes, 8101 File/Tape Switch support; requires additional 7K-byte main storage when recoverable databases are processed; available June 1982:

NC/NC initl	$162/$138 mo	$4,400/$3,740 OTC
		$19/$30 serv

©1984 Data Decisions

IBM 8100 Information System

Models 8130A, 8130B, 8140A, 8140B, 8140C, 8150A & 8150B

☐ Communications/Networks

Specific support provided for DPPX-based systems in a host 370/303X/3081/4300 environment (under DOS/VS, DOS/VSE, OS/VS1, or OS/VS2 MVS) includes database inquiry and update and transaction processing (via DTMS) for COBOL and assembly language application programs interfacing with host IMS/VS or CICS/VS applications, SNA communication with IMS/VS or CICS/VS applications using 8100 assembly language programs, communication with the host within SNA protocol and TCAM or VTAM in the host, basic control of BSC communication, 3270 data stream communication (DSC), and RJE tasks. Multiple tasks (sessions) can be active in the 8100 simultaneously and can share a common SDLC communication line.

Specific support in an 8100 host-controlled distributed environment includes application-to-application communication of data records (COBOL, FORTRAN, or assembly language), application program-to-remote database/transaction processing (via the remote DTMS), and application program-to-remote function (command sequences). Only point-to-point connections (no intervening systems) are supported. A manually dialed switched connection can be treated as a point-to-point connection. Only 1 8100 in a network of 8100s can be designated as a host, and only 1 host/remote link at a time is supported (multiple links are supported but not simultaneously). Multiple assembly language application programs can be active during a link, but only 1 COBOL program can be active during a link.

Other facilities are provided that run as independent applications under DPPX.

5760-XC1 DPPX/RJE • supports multileaving (BSC) or multiple logical unit (SNA/SDLC) remote job entry to a S/370-compatible host running OS/VS, DOS/VS, DOS/VSE, or VM under RES, JES, JES/NJE, or RSCS in appropriate versions for BSC or SDLC • can be initiated from keyboard/display or keyboard printer; accepts input from disk, diskette, or card reader for transmission to host; can concatenate data sets, which can contain data, job control statements, or both; returned output from host can be to disk, card punch, or 3289-3 printer; returned data sets in SNA/SDLC environment can be spooled to disk for later output to cards or printer • basic OS/VS1 and MVS system available March 1980; DOS/VS and DOS/VSE support available December 1980:

NC/NC initl	**$42/$36 mo**	**$1,175/$998 OTC** **$19/$30 serv**

5760-RC1 DPPX/DSC (Data Stream Compatibility) • permits, as an independently executing task, direct communications between a host 370, 303X, or 4300 and displays, printers, and clustered terminal systems connected to an 8100 system via local or remote loops, direct attachment features, or remote links; the 8100 system appears to the host as a 3270 system operating over an SDLC link; in effect, the 8100 functions as a 3270 remote controller • supports 3600 Finance Communications Controllers, 3650 Store Controllers, 3680 Point-of-Sale Control Unit • will also support another 8100 running DPCX (including DOSF) as of June 1982:

NC/NA	**27/23**	**750/637** **35/56**

5796-PNL DPPX/8100 Communications Design & Development Aid • interactive program to design and test applications logic without coding the programs; uses CLISTs • an IUP available June 1980; central service until June 1981; license fee charged for 12 months:

NC/NC	**150/NA**	**NA/NA** **NC/NA**

5799-BRP IBM 8100 DPPX/SP 3270 Personal Computer Attachment File Transfer • PRPQ; permits exchange of files between 3270 PC attachment and 8100; offers function and flexibility for 3270 PC attachment as an 8100 intelligent workstation; available January 1984:

NC/NC	**NA/NA**	**NA/NA** **NA/NA**

5799-BRQ IBM 8100 DPPX/SP Personal Computer RJE File Transfer • PRPQ; when interacting with SNA 3270 Emulation and 3770 RJE Emulation support package, allows PC to exchange PC programs and data files accessible by PC-DOS with an 8100 DPPX/SP system; the PC can be attached to 8100 through leased or dialed communication link • available January 1984:

NC/NA	**NA/NA**	**1,010/NA** **NA/NA**

☐ Program Development/Languages

Program development/language facilities described below are available for DPPX-based systems.

COBOL • complete Level 1 implementation of ANS COBOL X3.23-1974 plus CODASYL EVALUATE and PERFORM statements and explicit conditional statement to scope terminators for structured programming support • compiler and runtime library are implemented as separately priced, and usable, facilities.

5760-CB1 COBOL Compiler • optionally produces reentrant code • program development can be interactive or batch; application programmer can use DPS facilities for setting up display formats • available April 1980:

NC/NC initl	**$158/$134 mo**	**$4,200/$3,570 OTC** **$22/$35 serv**

5760-LB1 COBOL Run Time Library • uses reentrant code; required for execution of COBOL programs • available April 1980:

NC/NA	**27/23**	**750/637** **6/10**

FORTRAN • complete implementation of ANS Basic FORTRAN X3.10-1966 and FORTRAN X3.9-1966 except for execute-time setting of dimensions and formats, G format descriptor, nesting of format descriptors, and complex numbers; numerous extensions to support disk units, list-directed I/O operations, mixed expressions, 7 dimensions in arrays, program structure enhancements, and additional data types; largely compatible with OS/VS FORTRAN • separate compiler and runtime library facilities.

5760-F01 FORTRAN Compiler • optionally produces reentrant code • program development can be interactive or batch:

NC/NC	**127/108**	**3,400/2,890** **25/40**

5760-LM1 FORTRAN Run Time Library • required for execution:

NC/NA	**62/52**	**1,700/1,445** **15/24**

5760-AS1 Assembly Language (DPPX/ASM) • macro assembler; similar to DOS/VS assembler; produces relocatable code; interactive or batch program development:

NC/NA	**84/71**	**2,300/1,955** **17/27**

DPPX PL/1 • implementation of ANS PL/1 X3.53-1976 • follows PL/1 block structure and scope rules; supports STATIC, AUTOMATIC, and BASED storage class attributes; allows separately written PL/1 code to be selected from PL/1 source statement library and combined with source program at compile time • source programs require some revision for compiling/executing on OS PL/1 compiler • compiler and runtime library are implemented as separate facilities that run on different system; programs can be compiled on one system and run on other systems.

5760-PL1 PL/1 Compiler • object modules reentrant • provides extensive syntax error diagnostics and support for execution-time diagnostics; more than 1 PL/1 source program can be compiled for each PL/1 call; can use but does not require floating-point processor; data mapping is compatible with IBM S/370 OS PL/1 and DOS PL/1: support DPPX DTMS and DPPX DPSX run under DPPX BASE • requires 66K-byte memory and 160K-byte workfile disk space:

NC/NA	**383/325**	**10,300/8,755** **38/60**

 ©1984 Data Decisions

IBM 8100 Information System
Models 8130A, 8130B, 8140A, 8140B, 8140C, 8150A & 8150B

5760-LM2 DPPX PL/1 Library • reentrant runtime library routines: requires 20K- to 40K-byte main memory and 600K-byte disk storage:

NC/NA	**66/56**	**1,800/1,530**
		10/16

5760-XR2 DPPX APL • compatible with VSAPL Release 4: includes basic VSAPL functions/operations as well as most system commands, variables and functions • terminal support and auxiliary processing to access programs outside APL environment via DPPX APL support functions • user can write, debug, and execute APL programs from informal to full-size interactive application programs using local databases • user access to screens defined through DPPX DPS; creation of maps outside APL environment requires use of IMD component of DPPX DPS; user can access DPPX data sets/database and DTMS databases; user can access storage area up to 60K bytes • user can interface with other APL programs on same 8100 system; with programs written in other languages that conform to DPPX link protocols • requires 8130 or 8140 with at least 768K-byte memory; floating-point processor optional but recommended for performance reasons:

2,540/2,160	**424/361**	**NA/NA**
		44/70

☐ Program/Applications Development Aids

Program/applications development aids described below are available for DPPX-based systems.

5760-XC2 DMS/DPPX (Development Management System) • permits application development interactively through a series of data definition (data selection from a file), map definition (display formatting), and application definition (input field editing, arithmetic operations, program flow steps, and display flow) segments that can be performed independently, stored in a map specification library, and linked by an application generation step; elements stored in the library are accessible for editing/modification independently; all 8100 devices can be supported within a DMS program; assembly language routines can be incorporated and database and/or transaction management services can be accessed through DTMS; specific support is included in a distributed environment for submission of a transaction to CICS/VS or IMS/VS running in a S/370-compatible host • operates in TUTOR or PROMPT mode: TUTOR gives extensive explanation of features, capabilities, and options; PROMPT provides an abbreviated version of options; the user can switch back and forth between the 2 modes as desired; a HELP facility is provided in both modes to assist the user rather than abort a development step • makes use of DPS (see below); requires minimum of 384K-byte system and 1 1920-character display terminal • available June 1980:

NC/NA initl	**$150/$112 mo**	**$3,560/$3,025 OTC**
		$63/$101 serv

5660-265 DMS/DPPX Execution Facility • generates program defined by DMS/DPPX; replaces former requirement for conversion to COBOL; generated program runs as a freestanding module under the appropriate software • requires DTMS for interactive and/or database access • available January 1981:

NC/NC	**19/15**	**470/400**
		14/22

5760-XR6 DCMS/DPPX R.1 • Data Capture and Management System; a data entry package consisting of an interactive job definition program, an online execution program, a statistical recording batch program, and a local data interchange batch program • written in PL/DS; requires DPPX/BASE, DPS/IMD-FM, and DPPX/DPS; DMS/DPPX is recommended but not required • available March 1981:

NC/NA	**119/88**	**2,220/1,665**
		29/46

5760-XR1 DPS/DPPX (Distributed Presentation Services) Version 1 • DPPX only • a pair of components (Format Management for runtime and Interactive Map Development for interactive specification of display formats) to assist user in programming display formats for applications programs • IMD supports all of the 8775 advanced features and provides a comprehensive set of facilities to design data displays within an applications environment, such as horizontal and vertical scrolling (software driven), menu facilities, and HELP facilities; a library of map definitions is maintained; individual maps can be modified interactively and can serve as the basis for new maps for new applications programs; once defined, maps can control generation of source data structures (cataloged) and object modules for each device type; COBOL and assembly language development is supported; an optional HELP facility within IMD assists in defining error messages, subcommands, and options.

DPS/FM (Format Management) • required for runtime execution of application programs that used IMD to develop display formats and required by IMD when defining display formats:

NC/NC	**53/44**	**1,500/1,275**
		11/18

DPS/IMD (Interactive Map Definition) • requires FM:

NC/NC	**134/114**	**3,600/3,060**
		16/26

5660-264 DPPX/DPS V2 (Distributed Presentation Services Version 2) • includes all the functions of Version 1 and the same 2 components; enhancements are device independent programming support, improved performance, serviceability and error handling, more support for 3287 printers and programmed symbol devices, and outboard formatting for CICS/VS BMS mapping support applications on SNA/SDLC connections; available June 1981:

NC/NA	**180/135**	**NA/NA**
		15/23

DPS FM (Format Management) • Version 2; corresponds to 5760-XR1 FM:

NC/NA	**70/59**	**1,900/1,615**
		17/27

DPS IMD (Interactive Map Definition) • Version 2; corresponds to 5760-XR1 IMD • available November 1983:

NC/NA	**199/169**	**5,300/4,500**
		19/30

5660-267 DPPX/PS 3640 • presentation services for 3640 terminals; an ease-of-use feature for 8100 DPPX/BASE or DPPX/SP users:

NC/NA	**75/52**	**1,950/1,665**
		18/29

Interactive Transaction Generator (ITG) Feature • aids application programmer in describing 3640 device interface:

NC/NA	**312/265**	**8,115/6,890**
		52/83

5660-271 DPPX/IPF (Interactive Productivity Facility) • enhances usability of 8100 systems by providing simplified interactive dialogue interfaces; dialogues are provided for system use in data set and catalog handling, COBOL compilations and execution, systems operations and definition, analysis, and maintenance of profiles on DPPX users, environments, IPF options, IPF tables, and various tutorial functions • requires 512K-byte memory, a diskette, 58M-byte disk, a display, DPPX/DPS Format Management the DPPX/BASE CFE (5760-010 feature 6005, 6006, or 6007) • available December 1980 • Release 2 provides improved productivity in system use performance, system operation, and system management activities in support of DPPX BASE FEP6; also provides HELP panels and tutorials • available September 1982:

NC/NA	**42/36**	**1,175/998**
		11/18

5660-284 Cross System Product/Application Development (AD) for DPPX/SP • provides interactive environment for developing, testing, and generating application programs for execution under DPPX/SP; highly compatible with similar product for CICS/VS, SSX/VSE, MVS/TSO, and VM/SP CMS • runs on an 8100 with 768K bytes of memory; requires DPPX/SP and DPPX/SP IMD:

NC/NA	**175/150**	**4,575/3,890**
		25/40

©1984 Data Decisions

IBM 8100 Information System

Models 8130A, 8130B, 8140A, 8140B, 8140C, 8150A & 8150B

5660-285 Cross System Product/Application Execution (AE) for DPPX/SP • provides for production execution of Cross System Product/AD applications • runs on 8100 with 512K-byte memory; requires DPPX/SP:

NC/NA	**50/42**	**1,300/1,105** **6/10**

☐ Office Automation

5761-XR1 DPCX/DOSF (Distributed Office Support Facility/DPCX) • runs under DPCX Release 2 with spooling feature (6001) • provides, at the 8100, facilities for document creation, storage, formatting, browsing, revision, printing, archiving, retrieving, and transfer to host; also supports message traffic (electronic mail) among distributed 8100 and 3730 systems via host connection • Release 1 (May 1981) provides all 3730 functions plus enhanced wide text support, facilities for column manipulation, and 8100 command list processing and backup facilities; Release 2 (October 1981) adds several text functions such as block overstrike, line numbers, revision indicators, variable hyphenation, boldface (offset) print, and block underscore capabilities; supports automatic line wrap (operator ignores line end); all functions, except document creation and revision, supported on local/remote 3270 and 8875 displays; document creation and revision supported only on directly attached 3732 display with 3736 printer • document transfer between DOSF and S/370-compatible host supported under VTAM, ACF/VTAM, ACF/VTAME, TCAM, ACF/TCAM, CICS/VS, and IMS/VS; can also be used in conjunction with DISOSS or Document Interchange facility; all user-written programming done at host and downline loaded into 8100 DPCX system • can intermix document (text) and data modes for form letters; can use prestored text elements to create document; can use prestored document and address file to perform mass mailing • Release 2.1 (June 1982) includes Automated System Service for Installing Standalone Text (ASSIST) to allow attachment of loop configuration, communication port devices, and host link adapter; enhances usability; eliminates "white spaces" in documents before printing; and indicates document in control store • operates with DPCX R2.2 with #6001 Level F feature • Release 3.0 runs under DPCX Release 3 and supports 8140C processors; doubles number of concurrent user tasks from 31 to 62; supports data link attached loops, Scanmaster 1, and printing final form documents created on the Displaywriter; allows automated text facilities of DOSF to insert fields from RSDS records into documents; provides single command processor interface for desired function and new option to monitor disk usage space in a disk file • Release 4 provides for editing documents exchanged between IBM Displaywriter and 8100/DOSF system; also automates selected functions for business professionals to increase productivity; provides new Data Stream Compatibility-Extended (DSC-E) facility and spool file list processing; enhances records processing and archiving reliability; improves usability • provides file exchange between DPCX/DOSF and IBM 3270 PC Attachment for 3278 Display Station; stores and processes personal computer files including printing and conversion to DOSF document format; enhances DOSF list processing to include PC files • 3270 PC attachment supported through 3274 control unit connected to 8100 through direct or data link attached loops and/or through communication links; 3278 Display with 3270 PC Attachment can be used in personal computer mode to perform all PC functions with 3278 Display Station as the monitor, interactive mode with DPCX/DOSF, interactive mode with IBM S/370-compatible host through DPCX/DSC, S/370 host file transfer mode through DPCX/DSC, DPPX/SP-attached mode, DPCX/DOSF file exchange mode • available February 1984; requires 8100 configured to support DPCX; DPCX and DOSF require minimum of 768K bytes:

NC/NC initl	**$753/$639 mo**	**$12,300/$10,455 OTC** **$105/$168 serv**

Distributed Office Support System (DIOSS) • program products running on S/370-compatible host and 8100/DPCX system to support the Distributed Office Support Facility (DOSF) • supports interactive or batch transfer of documents between DOSF on 8100 DPCX system and host; 8100 program provides interface between 3732 text displays and IMS/VS or CICS/VS under OS/VS • host facilities available include document filing (with indexing), retrieving, archiving, deleting, and searching by document name or character string; jobs for batch execution can be submitted with documents to host; can input to STAIRS/VS • provides data security based on access codes, document ownership and level of document privacy; passwords can be assigned to end users to control file access • optional features provided for host print facility, direct document viewing facility, and STAIRS input formatter; 5740-XYK DIOSS • downline loaded from host to run on 8100/DPCX system operating as a controller for IBM 3730 system.

5661-172 DIOSS/8100/DOSF Release 1 • portion of DIOSS that runs on 8100 under DPCX:

NA/NA	**178/133**	**NA/NA** **35/56**

Direct Document Viewing Facility • feature for 8100/DPCX system; requires 5740-XYK • allows users to have documents in host library displayed on their screens without copying at local site:

NC/NC	**321/NA**	**NA/NA** **NC/NA**

5740-XY9 DIOSS S/370 • runs on S/370-compatible system and supported by IMS/VS or CICS/VS under OS/VS1 R.6.0 or 7.0 (4300 systems) or OS/VS2 MVS R.3.8 and VTAM or ACF/VTAM, TCAM, or ACF/TCAM:

NC/NC	**1,320/NA**	**NA/NA** **NC/NA**

Host Print Facility • requires 5740-XY9 • allows documents in host library to be printed on host-attached printer upon request from 3732 Text Display Station:

NC/NC	**160/NA**	**NA/NA** **NC/NA**

STAIRS Input Format Facility • requires 5740-XY9 • supports preparation documents at IBM 3732 terminal for batch input to STAIRS database:

NC/NC	**239/NA**	**NA/NA** **NC/NA**

5668-955 DISOSS/8100/DOSF Release 1 • designed to operate with DISOSS/370 Version 2 Release 1 running on a host S/370, 3031, 4331, or larger processor; combined systems provide document handling functions in a host/distributed processing environment • provides document and message distribution to users on same or different 8100/DPCX/DOSF systems • automatic logging of documents and messages per recipient; display, printing, and redistribution of received documents, host document filing with indexing, document search and retrieval, viewing of filed documents without copying, access protection, printing on host-attached printers, formatting for input to STAIRS database, and submission of batch jobs to host • runs under IBM 8100/DPCX; requires IBM Host Prep Release 4:

NC/NC	**200/170**	**3,930/3,340** **40/64**

5668-982 DISOSS/370 Version 2 Release 1 • operates on a host computer, Model S/370, 3031, 4331, or larger processor • with 5668-955, operates as replacement for 5740-XY9 and 5740-XYK (DISOSS/3730 Version 1) • includes all the features and options on the 5740-XY9 • requires OS/VS1 Release 7.0 or OS/VS2 Release 3.8 or later releases • requires 3704/3705 to attach subsystems; running under NCP/VS Release 5 or ACF/NCP/VS Release 1.0 or later releases:

NC/NC	**1,130/850**	**NA/NA** **232/371**

5668-004 DPCX/Document Interchange Facility • interactive, tutorial link to companion product running on host under CICS/VS (DOS or OS) for access to host Document Library Facility • formatting under SCRIPT/VS (Document Composition facility); documents accessed can be from 8100 (via DOSF) or from other applications • requires DOSF:

NC/NC	**51/NA**	**1,250/NA** **NC/NA**

5668-956 Interactive Display Text Facility (IDTF) • program runs on remote 8775 terminal but downline loaded from 8100

 ©1984 Data Decisions

IBM 8100 Information System

Models 8130A, 8130B, 8140A, 8140B, 8140C, 8150A & 8150B

running under DPCX or DPPX; designed to function with DOSF and DISOSS products:

NC/NC	92/68	3,000/2,550
		NC/NA

☐ Other Facilities

Facilities described below run as independent applications under DPPX/BASE.

5760-SM1 DPPX/SORT • executable sort/merge facility that runs as a separate task initiated interactively, initiated by a previously defined command list, or callable from an application program • sorting can be in ascending or descending order; collation sequence can be EBCDIC, ASCII, or user defined; can sort multiple data sets (up to 7); can sort records from different data sets with key fields in different locations; accepts only RSDS data; accepts database/transaction processing and indexed data sets; does not update indexes; creates new data set as a result of sort/merge operations • in addition to sort/merge operations, can select records based on comparison of fields (key fields or other) with constant:

NC/NC initl	$37/$32 mo	$1,000/$850 OTC
		$14/$22 serv

5760-XR5 DPPX/PT (Performance Tool) Version 1 • pair of separately available modules that monitor activity of DPPX/BASE components as related to use of processor, main memory, and disk storage • Release 2 includes DTMS transaction statistics • compatible with DPPX/BASE at FEP 6 level and DPPX/SP Release 1.

PT Monitor • collects, for output to tape or disk, such information as processor utilization by priority level, main memory usage of transient modules, and disk data set utilization:

NC/NC	60/NA	NA/NA
		NC/NA

PT Reporter Feature • for printout of collected data:

NC/NC	70/NA	NA/NA
		NC/NA

5660-286 DPPX/PT (Performance Tool) Version 2 • consists of monitor, reporter, accounting collector, and sample COBOL program to print accounting records; combines in one program the separate monitor program and reporting feature of Version 1 (5760-XR5) and adds accounting collector • captures and reports information from event trace points in DPPX systems; obtains DTMS transaction statistics from DTMS modules; at selected intervals, records collected data in disk data set; reporter provides formatted reports on processor, storage, device and data set use, environmental statistics, DTMS transaction statistics, and both transient and dynamic resident module use; usage data provided for each DPPX user • supports both DPPX/SP Releases 1 and 2; provides interval record (summary), user record for each active user, and device record for each device accessed by user • runs on any 8100 configuration that supports DPPX/SP; monitor requires 16K bytes of real memory and 7 logical blocks on disk, reporter requires 14K bytes of real memory and 34 logical blocks on disk, and account collector requires 11K bytes of real memory and 10 logical blocks on disk • requires DPPX/SP, DTMS for transaction statistics, and COBOL Compiler (5760-CB1) for same COBOL source program • available November 1983:

NC/NA	280/NA	3,500/NA
		NC/NA

5798-DKX Distributed Processing Connection Facility (DPCF) • FDP; provides concurrent access to multiple applications and subsystems from single terminal; applications and subsystems can reside in local 8100/DPPX system executing DPCF, remote 8100 DPPX or DPCX systems in the host System/370, 30XX, or 4300 with CICS, IMS, TSO; user terminal can be 8100/DPPX DPCF or System/370 terminal logged on to 8100/DPPX DPCF via HCF • available July 30, 1982; central service available until July 1983:

NC/NA	NA/NA	900/NA
		NA/NA

5760-ED1 GEN3644 • executes as application under DPPX BASE for development of applications using 3630 Plant Communications devices • 12-month term on monthly lease:

NC/NC	26/20	312/NA
		7/11

5798-DDP IBM 8100/DPPX DTMS/DPS Transaction Simulator • executes and documents a sequence of DTMS and DPS service requests so the user can define and analyze 1 or more processes to become familiar with service requirements and software behavior • an FDP available December 1980; central service until December 1981; license fee charged for 12 months:

NC/NC	95/NA	NA/NA
		NC/NA

5798-DGG IBM 8100/DPPX File Print Utility • processes DPPX RSDS or INDEX data sets; up to 4096-character records segmented into 100-character lines and printed or formatted into a print image • FDP, available September 1981; central service until September 1982; license fee is charged for 12 months:

NA/NA	25/NA	NA/NA
		NC/NA

5798-DJW IBM 8100/DPPX Peer Data Transfer • FDP; transfers data sets between IBM 8100/DPPX Systems over peer-to-peer communication link • entire catalog, catalog data sets with names using specified character string, or single data set can be transferred via simple command; user has choice of compression or compaction; choice of compaction table • facilitates large application development on multiple systems • central service available until April 30, 1983 • available April 30, 1982 • one-time charge:

NC/NA	NA/NA	630/NA
		NC/NA

5785-ECA IBM 8100/DPPX Extended Debugging Facility & Queue Loader • FDP; allows transaction programs to execute using DPPX ICF (Interactive Command Facility) rather than DTMS TPM (Transaction Processing Monitor); allows testing of basic DTMS transactions without starting DTMS; monitors execution of transaction programs; provides additional debugging and program tracing services for COBOL programs • central service available until May 31, 1983; available May 28, 1982 • monthly fee for 12 months:

300/NA	100/NA	NA/NA
		NC/NA

5798-DJL IBM 8100/DPPX Data Compression Host • FDP; provides set of routines to compress and decompress DASD data sets on MVS system; compression scheme in Data Compressor-Host FDP reduces repeating character strings into 1 or 2 characters • programming system: OS/VS2 • central service available until June 30, 1983; available June 25, 1982:

NC/NA	NA/NA	1,150/NA
		NC/NA

5798-DJN IBM 8100/DPPX Data Compression-Controller • FDP; provides set of routines to compress and decompress DASD data sets on IBM 8100 DPPX • compression scheme in Data Compression-Controller FDP reduces repeating character strings into 1 or 2 characters • central service available until June 30, 1983; available June 25, 1982:

NC/NA	NA/NA	300/NA
		NC/NA

5798-DHP Pattern Letter Generator/DPPX • FDP; provides capability to create/store standard letter text in a library, then merge text writer operator or local file variable data to create quality repetitive correspondence; interface enables unattended operations • central service available until July 31, 1983; available July 23, 1982:

NC/NA	NA/NA	1,900/NA
		NC/NA

☐ Applications Packages

DPCX Applications Packages

5796-PQD Student Registration System • IUP; for 8100 DPCX; university student registration • online distributed processing of student record and master schedule at registration; updated data sent to host on user-scheduled basis; can create/update files in

©1984 Data Decisions

IBM 8100 Information System

Models 8130A, 8130B, 8140A, 8140B, 8140C, 8150A & 8150B

standalone mode; license charged for 12 months:

$720/NA initl	**$235/NA mo**	**NA/NA OTC**
		NC/NA serv

5798-DDL IBM 8100/DPCX Accounting System/ Departmental • for public and private sector departmental accounting with 8100 DPCX; controls daily transactions; reviews expended funds; reports over-expenditures, transaction documentation, and accounts summaries • FDP written in DMS/3790-based code; available January 1981; central service until January 1982; licensing fee is charged for 12 months:

NC/NA	**110/NA**	**NA/NA**
		NC/NA

5798-DCY IBM 8100/DPCX Employment Service Job Browse Facility • for state employment agencies; uses 3270/8775 light pen to browse through job information system; requires DPCX; an FDP available October 1980; central service until October 1981; license fee is charged for 12 months:

NC/NA	**90/NA**	**NA/NA**
		NC/NA

5798-DCP IBM 8100/DPCX Outpatient Billing System • DPCX online patient registration, billing, and reporting; can retrieve patient data from a host database if available, or may operate completely independently of the host; an FDP available January 1981; central service until January 1982; license fee is charged for 12 months:

NC/NA	**265/NA**	**NA/NA**
		NC/NA

DPPX Applications Packages

5798-DDD IBM 8100/DPPX Payroll Management System • provides interactive file creation and maintenance as well as batch payroll processing • an FDP available February 1981; central service until February 1982; license fee is charged for 12 months:

NC/NA initl	**$300/NA mo**	**NA/NA OTC**
		NC/NA serv

5798-DFT COPICS Plant Monitoring & Control 8100 (PM&C) • records, monitors, and directs operational activities of a fabrication and assembly manufacturing facility, includes attendance and labor reporting, shop order tracking, and employee administration • requires DPPX/DTMS and PS3640; designed to operate with host COPICS under DOS/VSE/DL1 or OS/VS/IMS with CICS/VS but can be standalone • an FDP available October 1981; central service via Manufacturing Industry Program Center ongoing until 6 months notice; licensing charge is perpetual:

NC/NA	**474/NA**	**NA/NA**
		NC/NA

5798-DFR Host Interface • maintains the host Shop Order Data Base and prepares files of records to be inserted into 8100 database in conjunction with PM&C • availability, servicing, license terms same as PM&C:

NC/NA	**126/NA**	**NA/NA**
		NC/NA

5798-DFG IBM 8100/3640 Plant Floor Data Collection & Lot Tracking • allows addition and tracking of shop orders or lots through online transactions; written in DMS/DPPX; designed to be data element compatible with COPICS in the host • an FDP available September 1981; central service until September 1982; license fee charged for 12 months:

NC/NA	**310/NA**	**NA/NA**
		NC/NA

5798-DEJ IBM 8100/3640 Special Support Subroutines • allows programmer to implement special features of 3640 terminals; subroutines can be called from COBOL programs executing in DPPX/ICF; BATCH, DTMS-TSE, 3640 EXIT and DPPX/PS3640 EXIT environments • an FDP available December 1980; central service available until December 1981; licensing fee is charged for 12 months:

NC/NA	**40/NA**	**NA/NA**
		NC/NA

5796-BBR 8100/3640 Distributed Shop Floor System • records, monitors, and directs operational activities of a fabrication and assembly manufacturing facility: attendance, labor reporting, shop order tracking, and administrative routines • an IUP available May 1981; central service until May 1982; license fee is charged for 12 months:

NC/NA	**345/NA**	**NA/NA**
		NC/NA

5798-DEZ Order Entry • using IBM 8100 DMS/DPPX; set of interactive and batch programs for menu-driven order entry using 8775 terminals • requires 8100, 8775, 1M-byte memory, DPPX/DTMS • an FDP written in DPPX/DMS, available September 1981; central service until September 1982; license fee is charged for 24 months:

NC/NA	**175/NA**	**NA/NA**
		NC/NA

5787-GAA Distributed Plant Maintenance 8100/DPPX • FDP; plant maintenance system for process industry; includes equipment and inventory management as well as planned work-order management • for use on IBM 8100 installed at plant or in maintenance planning department • available July 30, 1982 • central service available until 6-month notice by IBM:

1,460/NA	**487/NA**	**NA/NA**
		NC/NA

5798-DED IBM 8100/DPPX Power Plant Maintenance • power plant information management system; interactive entry, review, and updating of corrective maintenance requests and work orders; creation of supporting files; report generation; security and auditability features • an FDP written in DMS/DPPX; requires 8100 DPPX with or without host communications; available September 1981; central service until September 1982; license fee charged for 12 months:

NC/NA	**170/NA**	**NA/NA**
		NC/NA

5798-DDN IBM 8100/DPPX Mortgage Banking System • interactive, online system for originating loan sales, tracking the inventory of saleable loans, and reporting status • an FDP available September 1981; central service until September 1982; license fee charged for 12 months:

NC/NA	**515/NA**	**NA/NA**
		NC/NA

5796-BCA 8100 Retail Merchandise Ticketing • for distribution applications; produces OCR-A scannable printed tickets, short stock keeping unit numbers, and other data for integrated merchandising; validates store, department/class, color and size at data entry • requires DPPX, COBOL, DPS, and DTMS • an IUP available November 1981; central service until November 1983; license fee is charged for 24 months:

NC/NA	**250/NA**	**NA/NA**
		NC/NA

■ HARDWARE

☐ Terms & Support

Terms • purchase, 30-day rental, 2-year lease; under lease plan, purchase option permits accrual up to 55 percent; cancellation charge is smaller of 5 months charges or 25 percent of remaining lease value; guaranteed maximum rate increase of 5 percent per year; rental and lease plans provide unlimited use • term lease available for 8100 systems (processors and related I/O) customers interested in financing the lease of eligible IBM equipment; available to customers willing to lease eligible equipment priced at a minimum of $100,000 • options A and B available; Option A provides Investment Tax Credit (ITC) to the IBM Credit Corporation and, thereby, lowers leasing cost to customer; Option B allows customers to use ITC benefits • now available under a Volume Procurement Amendment (VPA) for purchased system: processor discount is 10 percent reduction for 5 to 9 eligible machines, 15 percent reduction for 10 to 19 units, 25 percent reduction for 20 to 29 units, 30 percent reduction for 30 to 44 units, and 35 percent reduction for 45 or more units; other equipment has other VPA rates.

Support • maintenance charges begin after 3-month initial

 ©1984 Data Decisions

IBM 8100 Information System

Models 8130A, 8130B, 8140A, 8140B, 8140C, 8150A & 8150B

period • maintenance is bundled with rental and lease plans; separate contract with purchased systems; basic plan (shown in accompanying pricing information) provides 11-hour-per-day, 5-day-per-week coverage; various extensions of service are provided, at a premium over basic rates, up to full 24-hour, 7-day coverage; premium goes up to a maximum of 47 percent of basic rate • Customer Set Up for installation: customer is responsible for all unpacking, moving, and cable attaching; software program verifies proper assembly with specific indicators; a few units (8809 tape drives and 3289-3 printer and options) are installed by IBM personnel • training is partially bundled; prices include basic training courses for some customer personnel; more extensive training for system design and development purposes is separately priced.

☐ Systems Overview

An 8100 system is built around an 8130 or 8140 processor. It includes the CPU in single or dual versions, main memory, fixed disk storage, removable diskette storage, and communications ports for the attachment of local loop, remote loop, directly attached, and remote (via communications line) terminals. The 8140A and B single-processor models can be field upgraded to 8140C asymmetric dual-processor models similar to S/370 AP architecture. Expansion of fixed disk capacity and local/remote terminal attachment requires 8101 or 8102 Storage and Input/Output unit. The 8101s and 8102s support significant expansion for the attachment of local displays and printers; up to 4 magnetic tape units can be attached to an 8130/8140 processor or 8101 Storage unit (but not to both). The 8102 provides twice the disk capacity of the 8101 but does not support communication ports. The configuration rules are complex and are centered around system maximums rather than component maximums. The following entries indicate overall maximums and distinguishing features of the many possible 8100 configurations.

8130 Model A System Maximums • 1024K-byte memory; up to 4M-byte logical address space; 577M-byte disk; 2 diskette drives; a high-speed (38.4K-bps) loop and up to 5 loops total; 14 local/remote ports (no TP link greater than 9600 bps) plus 24 local display/printers; a tape attachment with up to 4 magnetic tape drives • up to 2 8101/8102s.

8130 Model B System Maximums • 2048K-byte memory; up to 8M-byte logical address space; 832M-byte disk storage; 2 diskette drives; up to 2 high-speed loops (38.4K bps) and up to 5 loops total; 14 local/remote ports (a single TP link can be greater than 9600 bps) plus 24 local display/printers; a tape attachment with up to 4 magnetic tape drives • up to 3 8101/8102s.

8140 A3X System Maximums • 256K-byte memory; 1088M-byte disk; 2 diskette drives; 19 local/remote ports plus 48 local display/printers; 4 magnetic tape drives; Expanded Operator Panel optional • up to 4 8101/8102s.

8140 A4X System Maximums • 320K-byte memory; 1088M-byte disk; 2 diskette drives; 18 local/remote ports plus 48 local displays/printers; 4 magnetic tape drives; floating-point hardware standard; Expanded Operator Panel optional, replaces 2 ports • up to 4 8101/8102s.

8140 A5X System Maximums • 512K-byte memory; 1088M-byte disk; 2 diskette drives; 16 local/remote ports plus 48 local displays/printers; 4 magnetic tape drives; Expanded Operator Panel not available • up to 4 8101/8102s.

8140 A6X System Maximums • 768K-byte memory; otherwise same as A5X; available only as field upgrade.

8140 A7X System Maximums • 1M-byte memory; otherwise same as A5X; available only as field upgrade.

8140 B5X System Maximums • 512K-byte memory; 1152M-byte disk; 2 diskette drives; 19 local/remote ports plus 48 local displays/printers; 4 magnetic tape drives; Expanded Operator Panel not available • up to 4 8101/8102s.

8140 B6X System Maximums • 768K-byte memory; otherwise same as B5X.

8140 B7X System Maximums • 1M-byte memory; otherwise same as B5X.

8140C System Maximums • 2M-byte memory; 2 CPUs; 1152M-byte disk; 2 diskette drives; 18 local/remote ports plus 48 local displays/printers; 4 magnetic tape drives; Expanded Operator Panel not available • up to 4 8101/8102s.

8150 AX0 System Maximums • 3M-byte memory with 16M-byte logical storage space; up to 4 high-speed (greater than 9600 bps) communication ports; up to 4 8101 or 8102 Storage and I/O Units for a maximum disk storage over 1G bytes; one 8101 can be configured with communication ports and/or Display and Printer Attachment features for a total of 12 communication ports; 8102 does not support communication ports.

8150 BX0 System Maximums • 6M-byte memory with 16M-byte logical space storage; dyadic processors; up to 8 high-speed (greater than 9600 bps) communication ports; up to 4 8101 or 8102 Storage and I/O Units for a maximum of over 1G bytes of disk storage; one 8101 can be configured with communication ports and/or Display and Printer Attachment features for a total of 12 communication ports; 8102 does not support communication ports.

☐ Packaged Systems

8130 Processors

8130 processors include CPU, main memory, fixed disk storage, diskette storage, and communications ports to accommodate local loop, remote loop (data link attached), local, and remote terminals. All components are housed in a single cabinet. Four 8130A models provide different combinations of moving-head and fixed-head disk storage; all models include 256K-byte memory. All models support 1 8101 Storage and Input/Output unit directly; 8130A models support a second 8101/8102 unit through a special feature; 8130B models support 2 additional 8101/8102s; a group of up to 4 magnetic tape units can be attached to a processor or to an 8101/8102 unit (but not to both). Memory can be expanded to 1024K bytes (8130A) or 2048K bytes (8130B); disk storage can be expanded to 577M bytes (8130A) or 832M bytes (8130B) via 8101/8102 units; the processor can be expanded to include up to 6 communication ports; up to 14 ports maximum can be included in a 8130 system via 8101 units. Model 8130 A23 can be upgraded to a Model 8130 B23, Model A24 to to Model B24, and Model B23 to B24. To upgrade an A21 or A22 model to a B23 or B24, the A model must be upgraded to either the A23 or A24.

8130 A2X Series • 256K-byte memory, expandable to 1024K bytes.

A21 • 29M-byte disk; no fixed-head disk storage:

	$1,139/$969 mo	**$19,040 prch**	**$161.00 maint**

A22 • 23M-byte disk; 131,072-byte fixed-head disk storage:

	1,167/993	**19,820**	**170.00**

A23 • 64M-byte disk; no fixed-head disk storage:

	1,195/1,017	**20,600**	**170.00**

A24 • 64M-byte disk; 131,072-byte fixed-head disk storage:

	1,223/1,041	**21,380**	**180.00**

8130 B2X Series • includes 1M-byte base processor memory expandable to 2M bytes, 1M-byte diskette storage, and nonremovable disk storage, with or without fixed-head disk storage.

B23 • 64M-byte nonremovable disk storage; upgradeable to B24:

	2,455/NA	**37,600**	**120.00**

B24 • 56M-byte nonremovable disk storage with 131K-byte fixed-head storage:

	2,483/NA	**38,380**	**130.00**

1530 System Expansion • provides capability to attach second

MO: first figure is monthly rental charge; second figure is monthly charge for 2-year lease; both include maintenance. PRCH: purchase price. MAINT: monthly maintenance charge for purchased systems. NA: not available. NC: no charge. Prices effective as of August 1984.

©1984 Data Decisions

IBM 8100 Information System

Models 8130A, 8130B, 8140A, 8140B, 8140C, 8150A & 8150B

8101 or 8809 magnetic tape unit directly to 8130; these 2 attachments are mutually exclusive:

111/95	2,780	13.50

8130 A23 Upgrade to B23 • field installable:

NA/NA	17,000	NA

8130 A24 Upgrade to B24 • field installable:

NA/NA	17,000	NA

8130 B23 Upgrade to B24 • field installable:

NA/NA	2,725	NA

8140 Processors

8140 single- and dual-processor models include CPU(s), main memory, fixed disk storage, diskette drive, and communications ports for local loop, remote loop (data link attached), local, and remote terminals; all components are housed in a single cabinet. The 8140 single-processor models provide different combinations of moving-head disk storage and fixed-head disk storage, main memory, floating-point hardware, communications ports, and support for Expanded Operator Panel. Dual-processor models provide 3 different memory capacities for basic systems containing 123M-byte disk storage, 18 communication ports, and floating-point hardware. All models support up to 4 8101/8102 Storage and Input/Output units. A group of 4 magnetic tape drives can be attached to the 8140 processor in lieu of 1 8101/8102 or to one of the 8101/8102 units. Memory expansion is supported only on 8140 A3X series; disk storage is expandable on all models to 1,088M bytes via 8101/8102 units. The number of ports for connecting local and remote devices depends on processor model, connected 8101s, and conflicting features (see Systems Overview section for maximums).

8140 Single Processor AXX Series

8140 A3X Series • 256K-byte memory, expandable to 384K bytes; 3 communication ports; Expanded Operator Panel optional.

A31 • 29M-byte disk; no fixed-head disk storage:

$1,692/$1,440 mo	$26,440 prch	$175.00 maint

A32 • 23M-byte disk; 131,072-byte fixed-head disk storage:

1,721/1,465	27,220	184.00

A33 • 64M-byte disk; no fixed-head disk storage:

1,756/1,495	28,000	184.00

A34 • 58M-byte disk; 131,072-byte fixed-head disk storage:

1,780/1,515	28,780	192.00

8140 A4X Series • 320K-byte memory; floating-point arithmetic hardware; 2 ports or Expanded Operator Panel optional.

A41 • 29M-byte disk; no fixed-head disk storage:

2,109/1,795	31,780	215.00

A42 • 23M-byte disk; 131,072-byte fixed-head disk storage:

2,144/1,825	32,560	224.00

A43 • 64M-byte disk; no fixed-head disk storage:

2,174/1,850	33,340	224.00

A44 • 58M-byte disk; 131,072-byte fixed-head disk storage:

2,197/1,870	34,120	231.00

8140 A5X Series • 512K-byte memory; no communication ports.

A51 • 29M-byte disk; no fixed-head disk storage:

2,609/2,220	28,940	236.00

A52 • 23M-byte disk; 131,072-byte fixed-head disk storage:

2,638/2,245	29,720	245.00

A53 • 64M-byte disk; no fixed head disk storage:

2,673/2,275	30,500	245.00

A54 • 58M-byte disk; 131,072-byte fixed-head disk storage:

2,703/2,300	31,280	253.00

A6X Series • 768K-byte memory; no communication ports.

A61 • 29M-byte disk; no fixed-head disk storage:

2,761/2,350	41,440	174.00

A62 • 23M-byte disk; 131,072-byte fixed-head disk storage:

2,797/2,380	42,220	183.00

A63 • 64M-byte disk; no fixed-head disk storage:

2,826/2,405	43,000	183.00

A64 • 58M-byte disk; 131,072-byte fixed-head disk storage:

2,855/2,430	43,780	191.00

A7X Series • 1.0M-byte memory; no communication ports.

A71 • 29M-byte disk; no fixed-head disk storage:

3,020/2,570	43,940	183.00

A72 • 23M-byte disk; 131,072-byte fixed-head disk storage:

3,043/2,590	44,720	191.00

A73 • 64M-byte disk; no fixed-head disk storage:

3,079/2,620	45,500	193.00

A74 • 58M-byte disk; 131,072-byte fixed-head disk storage:

3,108/2,645	46,280	200.00

4545 Expanded Function Operator Panel • provides conventional operator functions, such as access to memory, program stop/restart, and operating indications • not available on A5X, A6X, or A7X; mutually exclusive with 1601, 1602, 1603, 1604, or 4830 on A4X:

128/110	2,775	31.00

8140 Single-Processor BXX Series

8140 B5X Series • 512K-byte memory; 3 communication ports, expandable to 11; Floating-Point arithmetic feature, Expanded Operator Panel optional.

B51 • 58M-byte disk; 131,072-byte fixed-head disk storage:

$2,791/$2,375 mo	$46,110 prch	$210.00 maint

B52 • 123M-byte disk; 131,072-byte fixed-head disk storage:

3,260/2,775	55,000	256.00

8140 B6X Series • 768K-byte memory; 3 communication ports, expandable to 11; Floating-Point arithmetic feature, Expanded Operator Panel optional.

B61 • 58M-byte disk; 131,072-byte fixed-head disk storage:

3,043/2,590	48,610	219.00

B62 • 123M-byte disk; 131,072-byte fixed-head disk storage:

3,512/2,990	57,500	267.00

8140 B7X Series • 1.0M-byte memory; 3 communication ports, expandable to 11; Floating-Point arithmetic feature, Expanded Operator Panel optional.

B71 • 58M-byte disk; 131,072-byte fixed-head disk storage:

3,295/2,805	51,110	230.00

B72 • 123M-byte disk; 131,072-byte fixed-head disk storage:

3,764/3,205	60,000	276.00

8140 Dual-Processor CXX Series

8140 C72, C82 & C92 Models • dual processors with 1.0M- to 2.0M-byte memory, 10 communication ports, 2 integrated disk drives with 123M bytes (131K bytes are under fixed heads), basic Operator Panel; display and tape adapters, Floating-Point arithmetic, loops, communications interfaces, 8101 expansion units optional.

C72 • 1.0M-byte main memory:

$4,265/$3,630 mo	$79,500 prch	$293.00 maint

C82 • 1.5M-byte main memory:

4,776/4,065	84,500	311.00

C92 • 2.0M-byte main memory:

5,287/4,500	89,500	329.00

©1984 Data Decisions

IBM 8100 Information System

Models 8130A, 8130B, 8140A, 8140B, 8140C, 8150A & 8150B

8150 Series

The 8150 systems provide greater reliability and improved storage management processing with higher throughput over other 8100 systems. The 8150B Models are dyadic processors. The systems are designed using VLSI technology. Memory capacity is up to 3 (8150A)/6 (8150B) megabytes with logical storage up to 16M bytes. The system can support up to 4 8101/8102 Storage and I/O Units.

The 8150 has a new storage management option with keys and locks to allow more efficient use of logical storage. A single copy of CASS (common address space section) in logical storage is shared by all users. The ECC (error correction code) has been enhanced to provide correction of all single- and most double-bit storage errors. During IPL, the system performs a self test and will automatically reconfigure itself around a failing element. Also during operation, the system will re-IPL if a system unit fails and continue operation without it.

With DPPX/SP, the additional 8150 storage can be used with DASD Cache to keep disk records resident and reducing disk accesses.

No disk drives are integrated in the 8150; all disks are attached through the 8101/8102 Storage and I/O Units, up to 4 8101s/8102s can be attached to an 8150 system. One 8101 can be configured with communication ports and/or Display and Printer attachment features. The basic 8150 can be configured with up to 12 communication ports. With an 8101, this total can be increased to 20 ports. The ports can be used to attach single or double lobe loops or SDLC and BSC links. Up to 4 (8150A)/8 (8150B) ports can be high-speed (over 9600 bps) ports.

The 8150 is upward compatible with other members of the 8100 line. The various 8150 models can be field upgraded to the next higher model.

The 8150 is supported by DPPX/SP Releases 1 and 2, DPCX Release 4 and DOSF Release 4. DPPX/SP Release 2 supports all of its functions. DPPX/SP Release 1, DPCX Release 4, and DOSF Release 4 do not support I/O on both of the Processing and Control Elements (PCEs) and the improved storage management option. The performance of the 8150 is 1.3 (8150A) or 2.0 (8150B) times that of the 8140C in the DPCX/DOSF environment and 1.5 (8150A) or 2.4 (8150B) times that of the 8140C in the DPPX/SP Release 2 environment.

First customer deliveries began in June 1984. Field model conversions began in September 1984.

8150 A10 • single-processor system with 1M-byte memory:

$4,265 mo	$75,000 prch	$100.00 maint

8150 A20 • single-processor system with 2M-byte memory:

4,690	82,500	110.00

8150 A30 • single-processor system with 3M-byte memory:

5,120	90,000	120.00

8150 B20 • dyadic-processor system with 2M-byte memory:

6,540	115,000	150.00

8150 B40 • dyadic-processor system with 4M-byte memory:

7,390	130,000	170.00

8150 B60 • dyadic-processor system with 6M-byte memory:

8,250	145,000	190.00

Upgrades For 8150 • all models can be upgraded to the next higher model.

8150 A10 to A20 • field conversion:

NA	7,500	NA

8150 A10 to A30 • field conversion:

NA	15,000	NA

8150 A20 to A30 • field conversion:

NA	7,500	NA

8150 A30 to B20 • field conversion:

NA	40,000	NA

8150 B20 to B40 • field conversion:

NA	15,000	NA

8150 B20 to B60 • field conversion:

NA	30,000	NA

8150 B40 to B60 • field conversion:

NA	15,000	NA

☐ CPUs

8130A CPU • included in 8130A processor packaged component • organized around 64 sets of 8 32-bit registers: 4 sets used as save areas for primary and secondary program status vectors (PSVs), 8 sets for channel pointers, 48 sets for program general registers, and 4 sets reserved; each general register is usable as a 32-bit register, a 16-bit register, or 2 8-bit registers; 2 sets of registers are assigned to each applications program running • 8-level priority I/O interrupt system; a peripheral device shared among several programs can have separate levels assigned to each program • includes 2 communications ports and can support 4 additional ports; see Packaged Components for expansion capabilities and pricing.

8130B CPU • included in 8130B processor packaged component; new 32-bit word CPU constructed from VLSI components: FET chips pack 8,400 circuits per chip; bipolar chips pack 1,375 circuits per chip • supports 2M-byte real memory and 8M-byte logical memory • provides 50 percent faster instruction execution speed than 8130A CPU • can attach up to 3 8101 Storage and Input/Output Units and can support 2 high-speed communication ports: 2 high-speed loops (38.4K bps) or 1 high-speed loop and 1 high-speed communication link (greater than 9600-bps data rate).

8140 CPU • included in 8140 processor packaged component • single-processor system organized in the same manner as 8130 CPU, but supports different array of system capacities and features and faster memory; see Packaged Components for expansion capabilities and pricing • dual-processor system adds a second slave processor.

8150A CPU • included in 8150 AXO models; single processor and control element (PCE); supports up to 3M bytes of main memory and 4 high-speed communication ports • performance is about 1.4 times that of the 8140C and about 2.4 times that of the 8140B • new hardware timer facility with controlled power on, battery backed timer and optional Master Clock Synchronization Interface Feature • designed using VLSI technology reducing number of components and 64K-bit memory chips; new storage management option • supports up to 4 8101/8102 Storage and I/O Units.

8150B CPU • included in 8150 BXO models; dyadic processor with 2 Processor and Control Elements (PCEs), 2 I/O buses, and shared memory modules; both PCEs perform processing and I/O functions concurrently • supports up to 6M bytes of main memory with logical storage up to 16M bytes and up to 12 communication ports, (8 can be high speed over 9600bps), and up to 4 8101/8102 Storage and I/O Units; one 8101 can be used to connect Display/Printer Features and/or up to 8 additional communication ports • performance of 8150B is about 1.5 times that of the 8150A.

☐ Memory

8130A Basic Memory • included in processor component; 256K bytes (262,144) • MOSFET; 1500-nanosecond cycle time per 18-bit word fetch; word is composed of 16 data bits and 1 parity bit for each 8-bit segment.

1710 Processor Storage Type 1 • 128K-byte module (131,072) for 8130 processor • same specifications as basic memory • maximum of 1 module; cannot be installed with 1720:

$137/$117 mo	$1,250 prch	$9.50 maint

1720 Processor Storage Type 2 • 256K-byte (262,144) module for 8130 processor • same specifications as basic memory • maximum of 3 modules; cannot be installed with 1710:

275/235	2,500	19.00

8130B Basic Memory • included in processor packaged

©1984 Data Decisions

IBM 8100 Information System
Models 8130A, 8130B, 8140A, 8140B, 8140C, 8150A & 8150B

component; 1M-byte minimum error checking correcting (ECC) memory; detects and corrects single-bit errors and detects double-bit errors • expandable in 512K-byte increments to 2M bytes.

1730 Processor Storage • 512K-byte additional storage; maximum of 2 modules per system:

547/NA	5,000	20.00

8140 Basic Memory • included in processor packaged component; 256K (262,144) bytes in A3X series, 320K (327,680) in A4X series, 512K (524,288) in A5X series, 768K (786,432) in A6X, 1024K (1,048,576) in A7X, 512K (524,288) in B5X, 768K (786,432) in B6X, and 1024K (1,048,576) in B7X and CXX • MOSFET; 800-nanosecond cycle time per 18-bit word fetch; word is composed of 16 data bits and 2 parity bits, 1 for each 8-bit segment; 64K-bit chips are used in the A models and 16K-bit chips in the B models.

1490 Storage Increment • 128K-byte (131,072) module for 8140 A3X series only, 1 module maximum; other 8140 models increase memory by model upgrade:

433/369	1,250	30.50

8150 Basic Memory • ECC (error checking and connection) for all single-bit and most double-bit errors; implemented using 64K-bit chips mounted on 512K-byte boards with ECC logic • available in A models with 1M, 2M, or 3M bytes of memory; B models with 2M, 4M, or 6M bytes per system; addition of memory requires a system upgrade to the next higher system model.

Features For 8100 CPUs

3750 Floating-Point Feature • provides 30 instructions and 32 registers for 4- and 8-byte operands.

For 8140:

$197/$168 mo	$4,710 prch	$23.50 maint

For 8150:

197/NA	4,710	24.00

3901 Feature Expansion Prerequisite • required for certain expansions on 8101 and some processors.

For 8101 • required for first communication attachment Type 1 (1701 or 1702) ports (1 to 4) or Display and Printer attachment (3220) without 1701 or 1702; unavailable for Models A23 or A25 with Storage and I/O Switch feature (4525) • maximum 1 per 8101:

20/17	560	4.00

For 8140 Models B51 to B72 • required for first communication attachment (1701) ports 5 through 8 or Display and Printer attachment (3220) with communication attachment (1701) or Magnetic Tape Attachment (4901) without 1701; maximum 1/system:

20/17	560	3.50

For all 8150 models • required for communication ports 5 through 12; prerequisite for 1716, 1726, 1734, 1735, 1745, 1755, and 1764; maximum 1 per system:

180/NA	3,000	15.00

4545 Expanded Function Operator Panel • available for 8140 Models A31 through A44; provides operator access to processor storage, program stop/restart, and current operating indicators:

136/117	2,775	31.00

8100 Security Features • selective physical access to various system components; available on 8130A models and 8140 A models; included with other systems.

4655 Keylock • provides 3 modes of operation.

For 8130A Models:

NA	57	NC

For 8140A Models:

NA	57	NC

6555 Security Cover Locks • for 8101, 8130, and 8140, key locks for machine covers:

NA	39	NC

6566 Security Lock Diskette • for 8101, 8130, and 8140, key locks for mounted diskettes:

NA	34	NC

☐ I/O & Communications

All I/O operations share a common 18-bit-wide bus (16 data and 2 parity bits); disk and diskette use DMA to transfer data directly between memory and the device; all other I/O transfers are made between processor registers and the device • devices are attached to an 8100 system through datalink ports, through loop and direct attachment capabilities provided in the 8130/8140/8150 processors and in any attached 8101/8102 units (in effect, the 8101/8102 "extends" the I/O bus). Much of the complexity of configuration is establishing the physical attachment point of specific capabilities, which is critical when ordering a system; IBM developed a series of FAC codes to assist the planner in ordering capabilities to attach to ports. Later, IBM developed Selected Configuration (Sel Config) codes for the 8130 and 8140 to allow customers to order a functional unit containing a number of piece parts with one code. With 8150, IBM has eliminated the FAC and Sel Config codes altogether. A simple model number specifies the functional I/O unit.

The 8100 processors can attach multiple 8101s or 8102s or a mixture of the 2 units: 8130 AXX can attach 2 8101/8102s; 8130 BXX, 3 8102/8102s; and 8140, or 8150, 4 8101/8102s.

8101 Storage & Input/Output Units • only A2X models currently available; provides additional moving-head disk storage and/or device attachments to supplement the capabilities of the 8130, 8140, or 8150 processors; various models provide different disk storage capacities; all models provide for the same attachments, but require different attachment features in some cases; all models support a diskette drive • an 8101 supports up to 24 directly attached displays and printers plus up to 8 communications ports; system limitations for attachments to 8101s are equivalent to a "fully configured 8101" in an 8130 system and 2 "fully configured 8101s" in an 8140 system; actual physical attachments are spread across 1 or 2 8101s in an 8130A system; across 1 to 3 8101s in an 8130B system; across 1 to 4 8101s in an 8140 AXX system and across the processor and 8101s in a 8140 BXX system; in addition, 1 or 2 8101s in a system support up to 4 8809 magnetic tape drives (2 on 8140 BXX systems only) • an 8150 can attach up to 4 8101/8102s.

A20 • no disk; device attachment only:

$293/$250 mo	$6,725 prch	$15.50 maint

A23 • includes 64M-byte disk; device attachment:

832/708	16,635	76.00

A25 • includes 128M-byte disk; device attachment:

1,328/1,130	25,525	132.00

Selected Configurations (Sel Configs) for 8101 • IBM supplies the following.

1002 Sel Config • provides selection of one single-lobe, 38.4K-bps loop in Port 1; 9600-bps single-lobe loop in port 2; and an SDLC link at up to 9600 bps in port 3:

263/224	4,199	40.50

1003 Sel Config • provides selection and attachment of one single-lobe 38.4K-bps loop in port 1; 9600-bps single-lobe loop in ports 2 and 6; and an SDLC link at up to 9600 bps in port 3:

362/308	5,769	53.00

1004 Sel Config • provides for selection and attachment of one, single-lobe, 38.4K-bps loop in port 1 and SDLC links at up to 9600 bps in ports 3 and 4:

251/214	4,048	40.50

1005 Sel Config • provides for selection and attachment of one, single-lobe, 38.4K-bps loop in port 1; a 9600-bps, single-lobe loop in port 2; and SDLC links up to 9600 bps in ports 3 and 4:

330/281	5,158	52.50

1006 Sel Config • provides for selection and attachment of one single-lobe, 38.4K-bps loop in port 1; 9600-bps, single-lobe loop in ports 2 and 6; and SDLC links up to 9600 bps in ports 3 and 4:

428/364	6,728	65.00

©1984 Data Decisions

IBM 8100 Information System
Models 8130A, 8130B, 8140A, 8140B, 8140C, 8150A & 8150B

1008 Sel Config • provides for selection and attachment of 9600-bps, single-lobe loops in ports 1 and 2 and an SDLC link up to 9600 bps in port 3:

263/224	**4,199**	**40.50**

1009 Sel Config • provides for selection and attachment of one single-lobe loop in port 2 and SDLC links up to 9600 bps in ports 3 and 4:

251/214	**4,048**	**40.50**

1010 Sel Config • provides for selection and attachment of one single-lobe, 9600-bps loop in port 2 and SDLC links up to 9600 bps in ports 3, 4, and 5:

336/286	**5,467**	**53.00**

1011 Sel Config • provides for selection and attachment of one single-lobe, 38.4K-bps loop in port 1; 9600-bps, single-lobe loops in ports 2 and 6; and SDLC links up to 9600 bps in ports 3, 5, and 7:

482/410	**7,536**	**77.00**

1507 Diskette Drive & Magnetic Tape Attachment • for A20 only; accommodates diskette/drive (4520) plus Magnetic Tape Attachment (4521):

43/37	**1,076**	**4.50**

1701 Communications Attachment Type 1 • provides 4 ports • requires 3901 for first feature; 2 maximum:

19/16	**460**	**0.50**

1702 Communications Attachment Type 1 • for use with 1605 Programmed Communication feature; mutually exclusive with 1701:

19/NA	**460**	**0.50**

3220 Display & Printer Attachment • provides for attachment of up to 4 3277 Display Stations, 3732 Text Displays, and 3284/3286/3287/3288/3736 Printers in any combination; through up to 5 1506 additional Display and Printer features, system can support 24 devices:

128/110	**3,120**	**18.00**

1506 Display & Printer, Additional • provides for attachment of up to 4 additional devices to 3220; maximum of 5 per 3220:

19/16	**486**	**3.00**

4521 Magnetic Tape Attachment • supports up to 4 8809 tape drives • mutually exclusive 8809 Model 1B directly attached to 8140 • requires 1507 on A20:

93/79	**2,155**	**11.50**

8102 Storage & Input/Output Units • perform same function as 8101 but cannot be configured with communication ports • in addition, can be configured with Storage and I/O Switch to allow switching between 2 8130, 8140, or 8150 CPUs or between 2 PCEs on an 8150 Model BXX system • includes disk storage; can also support Display and Printer attachment for connection of up to 24 devices and Magnetic Tape Attachment for connection of up to 4 8809 Magnetic Tape Drives.

A15 • includes 129M bytes of disk storage on a single disk drive and access mechanism • transfer rate is 1M bytes per second; access time is 27 milliseconds with average rotational delay of 9.6 milliseconds:

1,165/NA	**21,000**	**68.00**

A17 • includes 259M bytes of disk storage on 2 disk drives, each with its own access mechanism • disk characteristics same as for A15:

1,860/NA	**33,500**	**88.00**

3220 Display & Printer Attachment • provides for attachment of up to 4 3277 displays and 3284/3286/3287/3288 printers in any combination • can support up to 24 devices using 1506:

128/NA	**3,120**	**18.00**

1506 Additional Display & Printer • for 3220, provides for attachment of up to 4 additional displays or printers in any combination • up to 5 can be installed with 3220:

18/NA	**486**	**3.00**

4521 Magnetic Tape Attachment • provides for attachment of up to 4 8809 Magnetic Tape Units to 8102 • not available if 8130/8140/8150 processor already attaches an 8809 Magnetic Tape Unit:

93/NA	**2,155**	**11.00**

4525 Storage & I/O Switch • provides for switching 8102 between 2 8130, 8140, or 8150 CPUs or between PCEs of 8150 Model BXX system • up to 2 8101s, 8102s, or a combination can be switched between 2 8100 processors • maximum of 1 8102:

199/NA	**5,020**	**20.00**

Communications

8100 processors attach to communication lines or remote/local loops through communications ports located in the processor and in an attached 8101 storage and input/output units. The 8130 supports up to 6 communication ports directly and up to 8 through an attached 8101; 8140 Models A31 through A34 support up to 3 communication ports directly and up to 16 through 2 attached 8101s; 8140 Models A41 through A44 support up to 2 communication ports directly and up to 16 through 2 attached 8101s; 8140 Models A51 through A74 support no communication ports directly and up to 16 through 2 attached 8101s; 8140 Models B51 through B72 support up to 11 communication ports directly and up to 8 through an attached 8101; 8140 Models C72 through C94 support up to 10 communication ports directly and up to 8 through an attached 8101. The 8150 supports up to 12 communication ports directly and 8 more for a total of 20 using one 8101 Storage and I/O Unit. Each port can be configured with a communications link or a local/remote loop; communication links support start/stop (asynchronous), BSC, or SDLC communications.

The 8100 provides the following specific support: asynchronous communication with IBM 2741, 3101, and 3767 terminals; BSC communication with IBM S/370 models 115, 125, 135, and 138 processors through ICA adapter, 3704 and 3705 Communication Controllers, 4331 processor through integrated communication adapter, 8101 Storage and Input/Output Unit connected to 8130/8140 processor, and other 8130/8140 processors; SNA/SDLC communication with IBM 3274-51 Control Unit, 3276 Control Unit Display Station, 3601/3602 Finance Communication Controller, 3631/32 Plant Communication Controller, 3651-25/75 Store Controller—Programmable Store Controller, 3684 Point of Sale Control Unit, 3767 Communication Terminal, 6670 Information Distributor, 8775 Display Terminal, 8101 Storage and Input/Output Unit, 8130/8140 Processors, 3704/3705-II/3705-80 Communication Controller, 4331 Processor through integrated communication adapter, and 3843 Loop Control Unit.

Ports • support attachment of a communication line, local loop, remote loop (data link attached), remote terminal, or local terminal.

Loops • support attachment of a large number of devices to a privately provided cable up to about 2,000 feet long; the number of devices depends on performance levels required • local loops operate at 9600 bps or 38,400 bps with 1 or 2 lobes; 2-lobe loops support more devices at the same performance level • remote loops are data link attached to the 8100 through a communications attachment to the 3842/3843 Loop Control Unit; data link transmission speed can range from 2400 to 9600 bps; remote loop cannot support the second lobe feature • common loop cable can include both indoor and outdoor cable; consists of shielded 2 twisted-pair cable, which can be purchased from IBM; the wrap capability in loop station connector (LSC) and loop wiring concentrator (LWC) allows alternate signal path to bypass a wiring failure on the loop; bypass feature of LWC allows failing I/O device or radial cable to be removed from loop signal path • devices can be relocated and reconnected to loop while it is operational; device can be located anywhere on loop as long as an LSC and power are available • IBM uses "masternode poll" protocol on the 8100 loops.

9600-bps Local Loop Support • Displays and Terminals: 3274-51C and 3276 clusters with 3278 and 3279 displays; 3287, 3289, 3230, and 3668 printers; 8875 single station display; 3640 Series terminals • Printers: 3262 (180 to 650 lpm); 3287 (80/120 cps) black or color; 3289 (40 to 400 lpm); 3230/3232 (450 cps);

 ©1984 Data Decisions

IBM 8100 Information System
Models 8130A, 8130B, 8140A, 8140B, 8140C, 8150A & 8150B

3668 (340 cps); 5210 letter quality (40/60 cps) • Card Equipment: 3501 50-cpm reader via 3289-3 printer; 3521 50-cpm punch and/or 2502-A1 reader via 3782 unit on 3289-3; the 3289-3 is no longer in new production as of December 1980, so details on card equipment are not included in this report.

38,400-bps Local Loop Support • Displays: 8875 single station displays; 3274/3278/3279 clusters with black/white and color displays; and 3230, 3668, 3287, or 3289 printers • Printers: 3287 (80/120 cps); 3230 and 3232 (450 cps); 3668 (340 cps); 3262 (180 to 650 lpm).

Remote Loop • data link attached; provides communication between a remote loop and 8100 system via a communication feature and remote 3842 or 3843 loop control unit; data link operates at 2400 or 9600 bps • supports the same array of devices as a local 9600-bps loop but operates at 2400/4800/9600 bps.

Remote & Local Terminals on Communications Ports • each port can support 1 communication line or locally attached terminal/subsystem; features are provided to support SDLC, BSC or start/stop (asynchronous) communication with RS-232C interface for external modem, V.35 interface for 56K-bps line, DDS interface, or internal modem (SDLC or BSC only) • configuration of a port for communication varies with the 8100 system • RS-232C communication (external modem) support point-to-point or multipoint configurations over non-switched facilities for terminals matching the disciplines supported; support for switched facilities (DDD) limited to communication between 2 8100 systems; DDS and V.35 communication support point-to-point configurations only • DDS and V.35 communication not supported on 8130 processor, but supported on 8101 attached to 8130 • specific support provided for direct-attached or remote displays, including 3274-51C and 3276 cluster controllers with black/white or color displays and attached printers; 8775 single station display; 3101 purchase only display • support also provided for teleprinters, including 3767; 2741; Teletype 33/35, 3232, 6670.

Other Terminal Subsystems • 2780/3780; 3630 plant communication devices; 3842/3843 remote loops; other 8100 systems, 3600 and 4700 finance systems, 3650 and 3680 retail systems.

Local Terminals • each port can support a locally connected (i.e., without modem) device or controller via an RS-232C interface (up to 40 feet) or V.35 interface (up to 1,000 feet) operating at up to 9600 bps; SDLC, BSC, or start/stop devices are supported; specific support provided is essentially for the same devices as for remote terminals with similar configuration rules for adapter and interface features, including clocking provisions.

Other Considerations • IBM uses different techniques for configuring the communication ports on the 8100 processors: for 8130, IBM offers the same selected configurations for the 8130 and 8140A and B processors as for the 8101 (1002 through 1011); for 8140C and 8150, IBM offers similar configurations but with different model numbers.

8140C Predefined Loop/Communication Attachment Sets • 8140C models use line sets to interface direct-attached loops and communications interfaces to predefined ports; line sets are related to specific ports, but order of implementation is fairly flexible (see requirements for each individual item) • various combinations provide either 2 direct-attached loops plus 2 to 8 SDLC interfaces or 3 to 4 direct attached loops and 1 to 7 SDLC interfaces • direct-attached loop speed switch selectable at 9600 or 38,400 bps • 1 SDLC interface can be X.21 switched, X.21 nonswitched, or V.35 standards (mutually exclusive); all others must be SDLC/EIA/CCITT standard; line interface speeds vary; EIA interfaces without clock to external modem; point-to-point or multipoint; switched or dedicated, with auto-answer at 4800 bps possible.

Features for Ports 1 to 4 on 8140C

1610 • 2 direct-attached loops, 2 SDLC/EIA/CCITT line interfaces up to 9600 bps; 1 direct-attached loop can be a 2-lobe loop with 4835 added:

$270/$231 mo	**$4,138 prch**	**$44.00 maint**

1611 • 3 direct-attached loops, 1 SDLC/EIA/CCITT line interface up to 9600 bps; 1 direct-attached loop can be a 2-lobe loop with 4835 added:

282/240	**4,289**	**44.00**

1612 • 3 direct-attached loops, 1 SDLC/X.21 switched line interface up to 48K bps; 1 direct-attached loop can be a 2-lobe loop with 4835 added:

303/259	**4,860**	**42.50**

1613 • 3 direct-attached loops, 1 SDLC/X.21 nonswitched line interface up to 48K bps; 1 direct-attached loop can be a 2-lobe loop with 4835 added:

296/252	**4,685**	**42.50**

1614 • 3 direct-attached loops, 1 SDLC/V.35 line interface to 56K bps; 1 direct-attached loop can be a 2-lobe loop with 4835 added:

287/245	**4,476**	**42.50**

Features for Ports 5 to 8 on 8140C

1620 • 1 direct-attached loop, 3 SDLC/EIA/CCITT line interfaces; requires 3901:

$276/$236 mo	**$4,447 prch**	**$44.50 maint**

1621 • 4 SDLC/EIA/CCITT line interfaces; requires 3901:

265/226	**4,296**	**44.50**

Features for Ports 9 & 10 on 8140C

1630 • 2 SDLC/EIA/CCITT line interfaces; requires 1620 or 1621 features already implemented; mutually exclusive with 3220 Display and Printer Attachment and with 4901 Magnetic Tape Atachment:

$140/$120 mo	**$2,378 prch**	**$22.50 maint**

Communication Features for Ports 1 & 2 on 8150

1711 • provides for 2 directly attached single-lobe loops with switch-selectable speeds of 9600 or 38.4K bps; not available with 1721 feature; maximum 1 per system:

$148/NA mo	**$2,220 prch**	**$22.00 maint**

1721 • provides for 2 directly attached double-lobe loops with switch-selectable speeds of 9600 or 38.4K bps • not available with 1711 feature; not available if high-speed ports are in an attached 8101; maximum 1 per system:

202/NA	**3,270**	**29.00**

Communication Features for Ports 3 & 4 on 8150

1712 • provides for 2 directly attached single-lobe loops with switch-selectable speeds of 9600 or 38.4K bps; not available with 1732, 1742, or 1752 • not available if high-speed ports are attached to 8101; maximum 1 per system:

$148/NA mo	**$2,220 prch**	**$22.00 maint**

1732 • provides for 2 SDLC/EIA RS-232C interfaces; unclocked and attaches to external modems with clock up to 9600 bps; point-to-point switched with auto-answer to 4800 bps; point-to-point dedicated 2- or 4-wire or multipoint 4-wire • not available if high-speed ports are in 8101; not available with 1712, 1742, or 1752; maximum 1 per system:

124/NA	**1,918**	**22.00**

1742 • provides for 2 SDLC/CCITT V.35 interfaces; port 3 is unclocked and attaches to external modem with clock up to 56K bps; port 4 provides same as port 3 or direct-connect with/without clock at 56K bps for total cable length of up to 1,000 feet or up to 200 feet to 3705 or up to 492 feet to 3725 • not available with 1712, 1732, or 1752; not available with high-speed ports in an attached 8101; maximum 1 per system:

134/NA	**2,292**	**19.00**

1752 • provides 1 SDLC/CCITT X.21 switched interface with auto-answer and auto-call on port 3 and 1 SDLC/CCITT X.21 dedicated interfaced point-to-point or multipoint on port 4, without clock up to 48K bps via DCE that complies with X.21 • not available with 1712, 1732, or 1742; not available if high-speed

 ©1984 Data Decisions

IBM 8100 Information System
Models 8130A, 8130B, 8140A, 8140B, 8140C, 8150A & 8150B

ports are in attached 8101; maximum 1 per system:

159/NA	2,885	19.00

Communication Features for Ports 5 & 6

1733 • provides for 2 SDLC/EIA RS-232C interfaces in 5 and 6: port 6 is unclocked and attaches to external modem up to 9600 bps, point-to-point switched with auto-answer up to 4800 bps, point-to-point dedicated 2- or 4-wire or multipoint 4-wire; port 5 provides same interface as port 6 or direct connect at 4800/9600 bps up to 40 feet • not available with 1763; maximum 1 per system:

$124/NA mo	$1,918 prch	$22.00 maint

1763 • provides 2 BSC/EIA RS-232C interfaces in ports 5 and 6: port 6 provides microcoded BSC interface for data rate of 1200 to 9600 bps without clock or 600 and 1200 bps with clock to DCE point-to-point dedicated 2- or 4-wire or multipoint dedicated 4-wire; port 5 provides same interface as port 6 or direct-connect up to 40 feet • not available with 1733; not available if BSC FAC codes 40, 41, 44, 45, or 47 are in attached 8101; maximum 1 per system:

226/NA	4,748	17.00

Communication Features for Ports 7 & 8

1734 • provides for 2 SDLC/EIA RS-232C interfaces in ports 7 and 8: port 7 is unclocked and attaches to external modem up to 9600 bps, point-to-point switched with auto-answer up to 4800 bps, point-to-point dedicated 2- or 4-wire or multipoint 4-wire; port 8 provides same interface as port 7 or direct connect at 4800/9600 bps up to 40 feet • not available with 1764; maximum 1 per system; requires 3901 Expansion Feature:

$124/NA mo	$1,918 prch	$22.00 maint

1764 • provides 2 BSC/EIA RS-232C interfaces in ports 7 and 8: port 7 provides microcoded BSC interface for data rate of 1200 to 9600 bps without clock or 600 to 1200 bps with clock to DCE point-to-point dedicated 2- or 4-wire or multipoint dedicated 4-wire; port 8 provides same interface as port 7 or direct-connect up to 40 feet • not available with 1734; not available if BSC FAC codes 40, 41, 44, 45, or 47 are in attached 8101; maximum 1 per system; requires 3901 Expansion Feature:

226/NA	4,748	17.00

Communication Features for Ports 9 & 10

1735 • provides 2 SDLC/EIA RS-232C interfaces in ports 9 and 10: both interfaces are unclocked and attach to external modems with clocks up to 9600 bps, point-to-point switched with auto-answer to 4800 bps, point-to-point dedicated, 2- or 4-wire or multipoint 4-wire • not available with 1745 or 1755; not available if high-speed ports are in attached 8101; maximum 1 per system; requires 3901 Expansion Feature:

$124/NA mo	$1,918 prch	$22.00 maint

1745 • provides for 2 SDLC/CCITT V.35 interfaces for ports 9 and 10; in 8150A, ports 9 and 10 are unclocked and attach to modem with clock up to 9600 bps, for 8150B, port 10 is unclocked and attaches to external modem with clock up to 56K bps; port 9 provides same as port 3 or direct-connect with/without clock at 56K bps for total cable length of up to 1,000 feet or up to 200 feet to 3705 or up to 492 feet to 3725 • not available with 1735 or 1755; not available with high-speed ports in an attached 8101; maximum 1 per system; requires 3901 Feature Expansion:

134/NA	2,292	19.00

1755 • provides 1 SDLC/CCITT X.21 switched interface with auto-answer and auto-call on port 10 and 1 SDLC/CCITT X.21 dedicated interface point-to-point or multipoint on port 9, without clock up to 48K bps via DCE that complies with X.21 • not available with 1735 or 1745; not available if high-speed ports are in attached 8101; maximum 1 per system; requires 3901 Feature Expansion:

159/NA	2,885	19.00

Communication Features for Ports 11 & 12

1716 • provides for 2 directly attached single-lobe loops with switch-selectable speeds of 9600 or 38.4K bps for 8150B or 9600 bps for 8150A • not available with 1726; not available if high-speed ports are in an attached 8101; maximum 1 per system; requires 3901 Expansion Feature:

$148/NA mo	$2,220 prch	$22.00 maint

1726 • provides for 2 directly attached double-lobe loops with switch-selectable speeds of 9600 or 38.4K bps for 9150B, 9600 bps for 9150A • not available with 1716 feature; not available if high-speed ports are in an attached 8101; maximum 1 per system; requires 3901 Expansion Feature:

202/NA	3,270	29.00

Adapters for 8101, 8130 & 8140

1601 SDLC Communications • with clock:

$69/$59 mo	$625 prch	$8.50 maint

1602 SDLC Communications • without clock:

50/42	585	8.00

1603 BSC/SS Communications • with clock:

30/25	774	3.00

1604 BSC/SS Communications • without clock:

19/16	519	2.50

1605 Programmed Communications Feature • provides control for 1 BSC RS-232C interface operating at 1200 to 9600 bps without business machine clock or 600/1200 bps with business machine clock; also for direct connection with business machine clock at 1200 to 9600 bps • user selectable clock and line speed; requires 8101:

104/NA	2,000	5.00

1622 Communication Ports Feature • for 8140C only • provides 1 SDLC and 3 BSC RS-232C interfaces: SDLC link operates at speeds up to 9600 bps without business machine clock (BMC); 3 BSC programmed communication ports operate at 1200 to 9600 bps without BMC or 600/1200 bps with BMC; 1 BSC port with BMC can be designated for direct connection at speeds from 1200 to 9600 bps:

448/NA	8,541	37.00

1623 Communication Ports Feature • for 8140C only • provides 2 BSC RS-232C programmed ports operating at 1200 to 9600 bps without BMC or 600/1200 bps with BMC; direct connection with BMC operation at 1200 to 9600 bps:

261/NA	5,208	17.50

Interfaces

1550 V.35 • interface to external DCE for operation at 56K bps or direct connection for operation at 9600/56K bps:

$21/$18 mo	$561 prch	$2.00 maint

3701 RS-232C • interface to external DCE or direct connection for operation at 9600 bps • requires 1602 or 1602 and 5200:

16/13	374	4.00

4830 Loop Adapter • provides for direct attachment of single-lobe loop operating at 9600/38.4K bps; maximum 3 per 8130, 14 per 8130/8101 combination, 11 per 8140, and 19 per 8140/8101 combination; not needed on 8140C models; on 8130, requires 1602 SDLC communications without business machine clock:

28/24	525	4.00

4835 Loop Adapter • second lobe for any 8130, 8140; requires 4830 on all systems except 8140C:

28/24	525	4.00

5200 Multispeed Clock • 4800/9600/56K bps; only 1 required for each 8130/8140 processor or 8101 unit in which the feature is required • requires 1602:

19/16	486	1.50

5655 X.21 Nonswitched Network Adapter • for 8130, 8140, and 8101 • up to 48K bps:

31/26	800	2.50

©1984 Data Decisions

IBM 8100 Information System

Models 8130A, 8130B, 8140A, 8140B, 8140C, 8150A & 8150B

5656 X.21 Switched Network Adapter • for 8130, 8140, and 8101 • up to 48K bps:

38/33	982	3.00

5660 DDSA • provides interface to AT&T Dataphone Digital Service network at data rates of 2400/4800/9600/56K bps • requires 1602 for SDLC operation to 56K bps or 1604 for BSC operation to 9600 bps:

40/34	972	2.50

Internal Modems

5500 SDLC or BSC • 600 or 1200 bps; non-switched lines only • requires 1601 or 1603:

$28/$24 mo	$625 prch	$6.00 maint

5501 SDLC Only • 600 or 1200 bps; switched facility (DDD) only; requires 1601 • includes auto-answer:

38/33	972	7.00

Directly Attached Terminals

All 8101 and 8102 models and the 8140 BXX series support the direct attachment of devices listed below. The features required for direct attachment are detailed in Packaged Systems section.

Displays • 3277-1/-2 Display Stations; 3732 Text Display Station • maximum 4 per 8100 system • requires 3220.

Printers • 3284; 3286; 3287-1/-2; 3288; 3736 Printers • maximum of 4 printers and displays per 8100 system.

☐ Disk

Internal Disk, 8130 Processor • 29M-byte (A21) or 64M-byte (A23); 2 models trade 6M bytes of storage for 131K bytes of fixed-head disk storage; the limited amount of data under the fixed heads is available much more quickly, on the average; incorporating the fixed-head storage capacity reduces the moving-head storage capacity to 23M bytes (A22) or 58M bytes (A24) • positioning time averages 27 milliseconds for all models; rotational delay (total access time for fixed-head storage) averages 9.6 milliseconds; data transfer rate is 1.031M bytes per second • expansion of disk storage is possible only through 8101 Storage and Input/Output units; no removable disk storage is available, other than the amount on the diskette drives.

Internal Disk, 8140 Processor • 29M- or 64M-byte storage without fixed-head capacity, or 23M-, 58M-, or 123M-byte storage with 131K-byte fixed-head disk capacity, depending on 8140 model • specifications are the same as 8130 internal disk.

Internal Disk, 8101 • 29M- (A11), 64M- (A13 or A23), or 128M- (A25) byte of moving-head disk storage; no fixed-head capacity • same specifications as 8130 disk.

Internal Disk, 8102 • 129M-byte (A15) or 256M-byte (A17) moving head disk; performance same as 8130 disk.

Internal Diskette Storage, 8130/8140 • removable; 1M bytes (985,088) • data transfer rate of 62K bytes per second • included in each model of the 8130/8140 Processor • format is either IBM Diskette Type 1 or 2D.

4520 Diskette 2D Drive • diskette drive for any model 8101 • same specifications as internal diskette • requires 1507 on 8101 A10 or A20 only; no extra feature required on other 8101s • 1 drive maximum per 8101; system maximum is 2 drives:

$157/$134 mo	$3,455 prch	$34.50 maint

☐ Tape

8809 Magnetic Tape Drives • used primarily for backup of database, but can be used for data storage for processing • 4 models provide the same performance and features, but differ in attachment to 8130/8140 processor and 8101 unit; all models provide transfer rates of 20,000 bytes per second (12.5 ips) in start/stop mode or 160,000 bytes per second (100 ips) in streaming mode; streaming mode, normally used to backup disk, inhibits all other operations on the 8130/8140 processor; 1600 bpi, phase-encoded, compatible with IBM 2400/3400 series drives; interblock gap for either is 0.6 or 1.2 inches; gap difference does not inhibit compatibility; full reel (2,400 feet) rewind time is 2.6 minutes.

8809-1A Drive • first drive for 8101 • see Packaged Components for required features • supports 1 8809-2, 8809-3, and another 8809-2, in that order, for a total of 4 drives maximum per 8100 system:

$727/$461 mo	$11,960 prch	$82.50 maint

8809-1B Drive • first drive for 8130 or 8140 processor • see Packaged Components for required features • supports 1 8809-2, an 8809-3, and another 8809-2, in that order, for a maximum of 4 drives per 8100 system:

898/562	14,640	109.00

8809-2 Drive • second or fourth drive:

647/410	10,610	74.50

8809-3 Drive • third drive:

720/461	11,960	82.50

☐ Terminals/Workstations

310X Terminal Equipment

3101 Display Terminal • moderately priced ASCII terminal available in 6 models, all of which display 1920 characters in 24 lines of 80 characters each; a 25th line provides terminal status; up to 128 ASCII symbols displayed within 7x14 matrix within 9x16 field on 12-inch screen; 95-character set also available; reverse video, scrolling, blink, intensity, and protected fields standard features; transmission is half- or full-duplex, asynchronous at 110 to 9600 bps • supports 1 3102 thermal printer:

NA/NA mo	$1,405 prch	$6.00 maint

TI6004 Serial Interface Matrix Printer • RPQ version of PC 5152 printer modified with serial interface card to attach to 3101 and operate as its screen printer; enhances Series 1-based Telephone Message Management System (TMMS) by providing printer functions for the message stations • 80 cps; bidirectional; 9x9 dot matrix; 40 to 132 characters per line • first customer shipments were in July 1984:

NA/NA	795	NA

327X Terminal Equipment

The 8100 can attach the 3274 control Models 51C and 61C and the 3276 Control Unit Display Station Models 11, 12, 13, and 14. See Report 950-I048-3270 for details of these systems.

373X Terminal Equipment

3732 Text Display Station • direct attach only • provides extensive features for document creation and editing • displays 24 lines of 80 characters each (1920 characters); lines 1 and 24 reserved for character position, scale, and status information in text mode; displays all keyboard characters except overstrike compound characters (printable on 3762) • text functions include automatic line wrap and indentation, decimal and centering tabs, column entry, word delete, word and word group underscore, and insert mode • attachment requires no-cost feature; requires selection of 1 keyboard:

$140/$119 mo	$3,170 prch	$25.00 maint

4621/2/3 Keyboard • 77-key EBCDIC Typewriter keyboard (4621); 77-key ASCII Typewriter keyboard (4622); or 75-key EBCDIC Typewriter keyboard (4623); all have 29 function/control keys and 48 text entry keys (except 4623, which has 46):

18/15	412	2.50

3736 Printer for 3732 • direct attach only • letter-quality printer for document preparation • 55 cps; bidirectional, impact; friction feed or optional tractor feed; 10 or 12 cpi; 6 lpi; 132 (10-pitch) or 158 (12-pitch) positions per line; can accommodate up to 6-part forms; interchangeable 96-character print wheel; EBCDIC or ASCII:

407/346	8,540	122.00

8750 Variable-Width Forms Tractor • accommodates forms up to 14.5 inches wide; Stacker and Carrier options recommended for optimum continuous forms handling:

NA/NA	286	NC

 ©1984 Data Decisions

IBM 8100 Information System
Models 8130A, 8130B, 8140A, 8140B, 8140C, 8150A & 8150B

5545 Stacker/Tray • receives forms from printer:

NA/NA	83	NC

5540 Carrier • guides forms into Stacker; also can be used to hold roll paper:

NA/NA	64	NC

6670 Terminal Equipment

IBM 6670 Series Information Distributor Printing Terminals • the 6670 employs micrologic under the control of OCL (Operator Control Language) programming to format, store, print, record, receive, or send document text or data; information is entered locally or off-line via a mag card stack reader-recorder integral to the 6670, or remotely from an 8100; another terminal, or word processor via communication facilities; not supported by 8140C models; OCL commands and instructions interact with user-defined formats stored within the 6670 to format text or data into finished page copy; formatted information is then transferred to internal, non-removable diskette storage, capable of handling about 100 pages of user text; subsequent text printing, card recording, or document transmission operations draw from formatted text in storage; micrologic-controlled paper handling and laser-electrophotographic (xerographic-type) imaging generate dot matrix graphics on plain paper surfaces; a document platen and optical imaging mechanism are also included on the 6670 for use in conventional office copying tasks.

8775 Terminal Equipment

8775 Display Terminal • high-function terminal for local or remote loop attachment (via port) or for remote or local communication attachment (via port; not available for direct display/printer attachment) • 4 models provide choice of loop (Models 1/2) or communication (Models 11/12) attachment and choice of display formats of 960/1920/2560 characters per screen (Models 1/11) and 960/1920/2560/3440 characters per screen (Models 2/12); choice of screen size is system option not operator option; displays 96 characters or 224 characters (APL) with special feature; all display lines are 80 characters wide; number of lines available are 12 (for 960 characters), 24 (for 1920 characters), 32 (for 2560 characters), or 43 (for 3440 characters); a 9x16 matrix is used for screen sizes up to 2560 characters; a 9x12 matrix is used for the 3440-character size; the basic terminal is essentially equivalent to a 3270 in terms of field formatting capabilities, including protect/unprotect, alphanumeric/numeric, normal/high intensity display, display/non-display, and selector pen allowed/not allowed; depending on keyboard selection, which includes data entry- and typewriter-style options, from 7 to 24 program function keys are included • Cursor Select standard feature provides "light-pen" type of field selection by using cursor and special key; special features for increased capability are described below (3624 and 5110).

8775-1 • loop attached; 960/1920/2560-character display • requires 4850:

$118/$100 mo	NA prch	$20.00 maint

8775-2 • loop attached; 960/1920/2560/3440-character display • requires 4850:

131/111	NA	20.00

4850 Loop Adapter • required for attachment to 9600- or 38,400-bps local loop or 2400-bps remote loop (via 3842 loop control unit):

11/9	328	2.00

8775-11 • communication (local or remote) attached; 960/1920/2560-character display • requires external modem, 1200-bps integrated modem, V.35 DDS interface feature, or X.21 adapter for dedicated network (3701 or 5550, 1550, 5650/5651 or 5655):

125/107	NA	24.50

8775-12 • communication (local or remote) attached; 960/2560/2560/3440-character display • same requirements as 8775-11:

140/120	NA	24.50

3701 External Modem Interface • RS-232C interface for transmission at 600 to 9600 bps over dedicated facilities • also requires 1488 clock if modem does not provide clocking; can be connected locally at up to 40 feet without modem:

16/14	374	3.50

5500 Integrated Modem • 1200 bps over dedicated lines • requires 1488 clock:

27/23	563	6.50

1550 V.35 Interface • up to 9600 bps over communication line or local connection at up to 1,000 feet without modem:

21/18	561	1.50

5650 DDS Adapter • point-to-point communication for SDLC transmission over dedicated lines at 2400, 4800, or 9600 bps:

34/29	840	1.50

5651 DDS Adapter • multipoint, tributary operation only, for SDLC transmission over dedicated lines at 2400, 4800, or 9600 bps:

33/28	840	1.50

5655 X.21 Adapter for Dedicated Networks • for attachment to DCE (Data Circuit Terminating Equipment) conforming to CCITT X.21 recommendation, for SDLC transmission at 2400, 4800, or 9600 bps:

32/27	800	1.50

1009 Set-Up Keylock Feature • controls access to change the unit address of the terminal:

NA/NA	75	NC

4621 75-Key Typewriter • EBCDIC keyboard; 12 program function keys (alternate shift):

19/16	417	2.00

4622 75-Key Data Entry • EBCDIC keyboard; 10 program function keys:

19/16	417	3.00

4623 75-Key Data Entry • EBCDIC keyboard; key punch layout for numerics; 10 program function keys:

19/16	417	3.00

4626 87-Key APL Typewriter • APL or EBCDIC (operator selectable) keyboard; 12 program function keys • requires 3624 Enhanced Function:

23/20	569	2.50

4627 87-Key Typewriter • EBCDIC keyboard; 24 program function keys (12 are alternate shift):

23/20	569	2.50

4690 Numeric Lock • locks keyboard if non-numeric key (other than 0-9/,/-/./dup) is depressed in numeric defined field:

NC/NC	NC	NC

4944 Monocase Switch • prevents display of lowercase letters; automatic mapping of keyed lowercase into equivalent uppercase • no cost option; can be installed in field:

NC/NC	NC	NC

4999 Magnetic Reader Control • supports attachment of a magnetic stripe encoded device to 8775:

16/14	364	2.00

5781 Programmed Symbols, PS-2 • provides control and 2 190-symbol sets for use with 3624 Enhanced Function:

NA/NA	202	NC

5782 Programmed Symbols, PS-4 • same as 5781 except provides 4 190-symbol sets:

15/13	324	2.50

6350 Selector Light Pen • permits operator to select fields of data from display for entry in system:

22/18	526	1.00

4670 • 87-key EBCDIC Typewriter/Text Entry and Edit Keyboard; for text editing; requires 8100 running DPCX R.2.2, and DOSF (Distributed Officed Support Function) R.2.1; IDTF

©1984 Data Decisions

IBM 8100 Information System

Models 8130A, 8130B, 8140A, 8140B, 8140C, 8150A & 8150B

(Interactive Display Text Facility) 5-PP; and 8775 features 9600, 3623, 3624, 3626, 3905, 5110, and 5781:

22/19	569	3.50

5580 • 3287 or 7436 slave printer attachment to 8775; Printer Adapter allows 1 slave printer to be attached to the 8775-1 or 8775-2; RPG TJ0045 allows 1 printer to be attached to the 8775-11 or 8775-12; printers may be 3287-1, -2, 1C, 2C, or RPQ 7436; supported by any program product that allows 3287 or 7436 to be attached to a 3274 or 3276:

49/42	1,440	4.50

3623 Extended Feature Storage • provides storage capacity required for 3624 Enhanced Function; maximum 1:

36/30	848	4.00

3624 Enhanced Function • adds APL set display capability as well as highlighting, partitioning of screen, and validation options; highlighting by character is supported for blink, reverse video, and underscore in addition to the standard intensity by field; user can define up to 8 independent partitions for display and entry; partition is assigned number of lines, no horizontal partitioning; validation features include mandatory enter or fill and immediate send on completion of field; does not include scrolling capability of 5110 • requires 3622 and 3905 • downline loaded from 8100 to which 8775 is attached; cannot operate with 5110 Partitions and Scrolling and IDTF; selection is from 8775.

5110 Partitions & Scrolling • permits user to define up to 8 independent partitions, as with 3624, but adds capability to scroll up and down independently within each partition via key; adds 58-line buffer (4640 characters) to support scrolling • requires 3622 • downline loaded from 8100 to which 8775 is attached; cannot operate with 3624 Enhanced Functions or IDTF; selection is from 8775:

NC/NC	NC	NC

Interactive Display Text Facility (IDTF) • program product licensed to an 8100 processor and downline loaded for execution to an 8775 terminal attached to the processor • designed to be used with Distributed Office Support Facilities (DOSF), DPCX operating system, and Distributed Office Support System (DIOSS) • this support gives an operator access to text functions of DOSF and host-oriented storage, retrieval, and distributed facilities of DISOSS; the data functions are determined by application program to which 8775 is attached; cannot function with 3624 Enhanced Functions or 5110 Partitions and Scrolling; selection is from 8775; see IDTF entry under Office Automation section.

3622 Feature Storage • provides control storage to support 3624 or 5110 or IDTF:

29/25	754	3.00

3905 Feature Adapter • provides logic and control for 3624:

15/13	424	2.00

1090 Audible Alarm • sounds under program control or on next-to-last character on screen to alert operator:

2/2	93	NC

6340 Security Keylock • key-controlled disabling of keyboard or program modification of displayed data:

NA/NA	37	NC

☐ Printers

3268 Printers • 340-cps, freestanding, bidirectional, dot-matrix printer; 10- or 16.7-cpi pitch, 3-, 4-, 6-, or 8-lpi vertical spacing, 132 print positions; APL/TEXT character set and SNA character string (SCS) supported as standard features in all environments except when attached to a console position on the 4341; 3270 Datastream (non-SCS) available on Model 2 only; variable-width forms tractor for up to 6-part forms up to 16 inches wide; 1920-character buffer; model conversions not recommended; 2 paper exits for forms stacking or for short printouts; attachment is model dependent.

3268-1 • attaches to 8130, 8140, or 8101 via 4830/4835 directly attached loop or via 3842 or 3843 Loop Control Unit:

$394/$335 mo	$7,500 prch	$63.00 maint

3287 Printers • operate at 80 or 120 cps depending on model • all models provide 132 print positions, 10 cpi, 6/8 lpi, and dual-case (upper/lower); paper is 8 to 14.88 inches wide; up to 6-part forms; dot-matrix printing is bidirectional using a 4 of 7-wide x 8-high dot matrix; all models are desktop units; Models 1C and 2C print in red, green, and blue as well as black, with standard multicolor ribbon cartridge.

3287-1 • 80 cps; attaches to 3274C or any 3276 Control Unit; also attaches to integrated 3220/1506 display and printer attachments, which can handle total of 24 devices in any combination; only 1 subsystem (24 devices) of this type can be attached to any 8130, and 2 subsystems (48 devices) per 8140:

275/234	4,830	37.50

3287-2 • 120 cps; otherwise same as 3287-1:

336/286	5,150	46.50

3287-11 • 80 cps; can be attached to all local or remote loops:

319/272	4,995	41.50

3287-12 • 120 cps; can be attached to all local or remote loops:

381/324	5,315	50.00

3287-1C • 80 cps; color printing; attaches to 3251C or 3276 control unit:

340/290	5,210	42.50

3287-2C • 120 cps; color printing; attaches to 3251C or 3276 control unit:

400/340	5,530	51.50

1120 • APL text capability feature:

6/5	165	0.50

3610 • extended character set adapter:

21/18	429	3.00

5781 • programmed symbols, set PS-2:

45/39	826	4.00

5782 • programmed symbols, set PS-4:

37/32	662	2.50

5783 • programmed symbols, set PS-4A:

81/70	1,485	11.50

4110 Friction Feed • handles single-part forms 8 to 15 inches wide; interchangeable with 8700:

6/5	151	0.50

8700 Forms Tractor • handles multipart forms (6 recommended maximum) from 3 to 15 inches wide; interchangeable with 4110:

6/5	151	0.50

5210 Printers • 40- or 60-cps bidirectional, desktop, daisywheel printer for correspondence-quality printing on discrete sheets or continuous forms; 10-, 12-, and 15-pitch, up to 198 columns, proportional or fixed spacing; 5.3-, 6-, and 8-lpi vertical spacing; superscripts and subscripts, 96-character sets in choice of 12 fonts; attaches via 9600-bps direct attach loop; up to 5 5210s per loop, require DPCX R.2.2 and DOSF R.2.1.

5210-G1 • 40 cps:

NA/NA	5,420	54.00

5210-G2 • 60 cps:

NA/NA	5,835	58.50

7850 Continuous Forms Feed • variable width:

16/13	325	8.00

☐ Data Collection Systems

Actively marketed special-purpose terminal clusters that can attach locally or remotely to 8100 systems include the 3600 and 4700 Finance Communication Systems, the 3630 Plant Communication System, the 3680 Retail System and the 2 3650 systems, the 3650 Programmable Store System (which includes the 3658 Supermarket System as a subset) and the 3650 Retail Store System. Note that in addition to attaching the entire 3630 Plant Communication System, the 8100 can directly attach the component 3640 series terminals running under software residing in the 8100 instead of in the 3630 series controllers.

 ©1984 Data Decisions

IBM 8100 Information System
Models 8130A, 8130B, 8140A, 8140B, 8140C, 8150A & 8150B

3600 Finance Communication System • provides bank office automation for central offices and branches; automatically collects data from human tellers and automated tellers and transmits it using SDLC protocol at 1200 bps • 5 diskette-based 3601 models and 2 disk-based 3602 models collect and batch data from local loop devices including 3603 Terminal Attachment Units (2 models), 3604 Keyboards (5 models), 3606 Financial Services Terminals (2 models), 3608 Printing Financial Services Terminals (2 models), 3610 Document Printers (4 models), 3611 Passbook Printers (1 model), 3612 Passbook and Document Printers (3 models), 3614 Consumer Transaction Facilities (4 models), 3615 Administrative Terminal Printers (2 models), 3616 Passbook and Document Printers (1 model), 3618 Administrative Line Printer (1 model), and the 3624 Consumer Transaction Facility (4 models).

3630 Plant Communication System • provides a manufacturing data collection facility that can attach locally or transmit to a remote 3704 or 3705 Communications Controller • the 3631 and 3632 Plant Communication Controllers collect data from the 3641 Reporting Terminals (2 models), the 3643 Keyboard Displays (3 models), 3642 Encoder Printers (2 models), 3644 Automatic (sensor-based) Data Unit (1 model), 3645 Printer (1 model), 3646 Scanner Control Unit (1 model), 3647 Time and Attendance Terminal (1 model); important options are hand-held magnetic scanners and magnetic slot readers • the 3842 and 3843 Loop Control Units provide additional remote capabilities for collecting data from terminals on point-to-point or multipoint lines; a loop control unit can operate as terminal to another loop control unit, thus, the systems can be chained, with paths to 8100, 4300, 3030, 3081, or System/370 processors.

3650 Programmable Store Systems • 3 configurations: 2 are specific supermarket and specific retail store configurations, to provide applications-oriented data collection systems; the third configuration can support either supermarket or retail store operations • the supermarket configuration is controlled by the 3651 A60 and B60 disk-based store controllers which collect data from up to 24 3663 supermarket terminal stations (5 models), which in turn can attach 3666 checkout scanners or 3667 checkout scanners at each terminal; the 3669 adapter must be included with the 3651 to allow 2400-bps communication to any 3081 system processor • the retail store system is controlled by the 3651 Models A50 and B50 disk-based Store Controllers; 1 to 3 loops can each attach up to 64 terminals each or a total of 191 terminals, although this number would preclude a reasonable response time; terminals are selected from the 3643 point of sale terminal (2 models), 3657 ticket unit, and 3275-3 display station with or without 3284-3 or 3784-1 printers • a third 3650 programmable store system associated with 3651 disk-based store controller models A25, B25, A75, B75, C75, and D75 allow either supermarket or retail or both configurations; like the A50 and B50 models, up to 191 terminals on 3 loops can be addressed; these terminals can be selected from the entire roster: including the 3653 point of sale terminals, the 3663 supermarket terminals, the 3666 and 3667 checkout scanners, the 3275-3 display station, the 3284 and 3784 printers, the 3647 ticket unit, the 3659 remote communications unit, and the 3669 store communication unit • controller models A50, B50, A75, B75, C75, and D75 require an external modem which can be either a 3872 2400-bps or 3874 4800-bps modem.

3680 Programmable Store System • a small diskette-based retail system for single-terminal or multiple-terminal stores; the 3684 point of sale controller can either be an integrated single terminal (Model 1) or a master terminal for loop-attached slave 3683 point-of-sale terminals; either a 1200-bps integrated modem, 3872 external 2400-bps modem, or 3874 external 4800-bps modem must be added to transmit in BSC or SDLC to the host 3081 system processor or a 4300, 3030, 3081, or 8100; OCR wands, magnetic wands, and printers are terminal options.

4700 Finance Communication System • compatible upgrade for 3600 system, with support of 60 workstations; 1.4 times 3600 throughput; diskette-based 4701 controller can attach 4704 Display, 4710 Validation Printer, and all 3600 terminals: 3603, 3604, 3606, 3608, 3610, 3611, 3612, 3614, 3615, 3616, 3624.

• END

©1984 Data Decisions

IBM 8815 Scanmaster I Facsimile Terminals
Models 1, 3 & 4

■ PROFILE

Function • high-performance, digital facsimile transceiver; analog transmission optional • local print capability handles noncoded and formatted text documents • message store/forward/routing in conjunction with host processor.

Type • floor console, all models.

CCITT Compatibility • Group 2 on RPQ basis only; not compatible with Group 3.

Maximum Scanning Width • 7.87 inches, all models.

Feeder • auto-feed, 30-document capacity; 8.5x14-inch document.

Image Resolution • 203x98 lpi standard; 203x196 lpi fine detail.

Half-Tone Support • none.

Communications • dedicated or switched line (DDD) at speeds to 9600 bps (Model 1); 4800/2400 bps Models 3 and 4 • all communicate terminal-to-terminal/system-to-system under SNA/SDLC • Models 3 and 4 include an FCC-certified, half-duplex 4800-/2400-bps modem • attaches to another Scanmaster or S/370, 4300, 303X, and 308X processor.

First Delivery • March 1983.

Units Installed • not available.

Comparable Systems • competitive with all like general-purpose Group 2 and 3 transceivers, especially Burroughs dex family, Mitsubishi FA585, EMT 2000/2200/9136/9140/9160/9600, Pitney Bowes 8900, NEC 1, 2, 3, Panafax UF family, Ricoh R-120/R-3300/R-5000, Teleautograph Omnifax Series, and Xerox 495.

Vendor • International Business Machines (IBM) Corporation, Information Systems Group • National Accounts Division (NAD); 1133 Westchester Avenue, White Plains, NY 10604; 914-696-1900 • National Marketing Division (NMD); 4111 Northside Parkway, Atlanta, GA 30327; 404-238-2000.

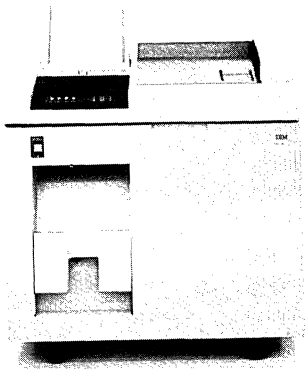
Canadian Headquarters • IBM Canada Ltd; 3500 Steeles Avenue East, Markham, ON L3R 2Z1 • 416-474-2111.

Distribution • worldwide via local IBM sales/service offices.

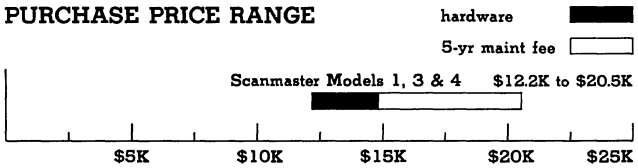
GSA Schedule • listed.

■ ANALYSIS

With Scanmaster, IBM offers a facsimile system that can be used for terminal-to-terminal or terminal-to-system (host processor) communication. The latter is particularly significant since it provides a powerful message/document store-and-forward facility operating under control of an IBM S/370, 4300, 303X, or 308X host. Scanmaster runs under IBM's Distributed Office Support System (DISOSS/370) which allows message/document distribution to office workstations such as Displaywriter, 8100/DOSF, and the 5520 administrative system. IBM's Optional Image Distribution System package supports document distribution for Scanmaster transceivers connected to an IBM host under CICS/VS. It stores received documents on disk and routes them to destinations defined by document distribution lists.



PURCHASE PRICE RANGE



SCANMASTER FACSIMILE TERMINALS PURCHASE PRICING bar graph covers range between individual family members • hardware costs are denoted by solid black bar; associated 5-year maintenance fee is represented by open bar • Model 1 is basic unit with no integrated modem; it requires a modem interface option or DDS adapter • Models 3 and 4 include all standard features plus an integrated modem • **SMALL CONFIGURATION** price consists of a Model 1 with an optional data-input keypad for routing documents and a modem interface • **LARGE CONFIGURATION** price consists of a Model 3 or 4 with standard integrated modem • prices shown are for single-quantity purchase • vendor offers multiple-purchase discounts.

IBM also permits the 3270 Personal Computer and 3278-2, -3, 3279, 3290, and 8775 terminals to view images received by Scanmaster. The image-view facility operates under a CICS program running under Graphical Data Display Manager, Release 3. Other required software includes DISOSS/MVS Version 3 and DISOSS/PS1.1, and the PL/1 transient library. While this image-view facility allows document scrolling/rotating, users cannot edit documents on the screen.

As a facsimile transceiver, Scanmaster has no remarkable technical characteristics that distinguish it above competitive products. In fact, its resolution is on a par with competitive transceivers, and it is priced higher than most. Also, it is not CCITT compatible except on an RPQ basis, which means it cannot communicate with competitive transceivers and is restricted to an IBM SNA/SDLC environment. If a user elects to incorporate the CCITT Group 2 RPQ for communication with other CCITT-compatible transceivers, transmission time for a standard document is 3 minutes.

The principal strength of Scanmaster is the aforementioned document storage retrieval. For large organizations with disbursed offices, the ability to store documents in a central location and distribute them to designated offices can be invaluable.

Until early 1984, the only real competition for IBM came from Ricoh's (nee Rapicom) SAF/PAK and Intelligent I options offered on the R-5000 and R-3100/-3300 transceivers. SAF/PAK allows users to store up to 30 documents at the R-5000 transciever, and

 ©1985 Data Decisions

IBM 8815 Scanmaster I Facsimile Terminals
Models 1, 3 & 4

deliver them to 100 locations in the network via the integral telephone number storage and auto-dial/polling facilities of the R-5000.

Intelligent I option allows documents generated on the R-3100 and -3300 transceivers to be routed to and stored on a host processor for later retrieval and distribution. Intelligent I furnishes a modified asynchronous, HDLC, and IBM BSC 2780/3780 protocol, allowing the transceivers to interface with a multiplicity of mainframes. The transceiver-host interface is supported by Ricoh's Fax Device Handler software, relieving the user from the need to develop his own program. IBM's distribution approach is far more powerful, however. While IBM allows multiple destination addresses to be transmitted simultaneously, only one address is supported by Intelligent I.

In addition to Ricoh, Pitney Bowes, Panafax, and NEC also offer local storage-and-distribution facilities. Unlike Ricoh, which employs RAM for document storage, these companies use a Winchester disk that greatly increases the number of storable pages. The Pitney Bowes Model 8900, for example, stores up to 600 pages versus 30 (60 optional) for Ricoh.

None of the Scanmaster competitors, however, can selectively disseminate individual pages (see Strengths). This technique wastes considerable storage space on the receiving transceiver, and it increases communication costs by sending uncounted material. It is surprising that companies using disk for document storage haven't developed either a random or indexed retrieval routine that would extract pages from disk, build transmission queues, and transmit only relevant pages. This would blunt the major advantage of Scanmaster.

Until that facility becomes available, those looking for an IBM alternative should investigate the Net Master option offered with the Xerox 495-I. As explained in report 990-X253-0400, it allows users to create distribution lists and store multiple documents on a **personal computer's** disk or diskette. Net Master is a disk-resident software package that links a personal computer (e.g., an IBM PC/XT or Xerox 16/8) to the Model 495-I. Net Master transfers the contents of the PC user's disk to the attached 495-I facsimile transceiver where the PC's ASCII data stream is converted to a CCITT Group 1, 2, or 3 format for forwarding to the destination facsimile device. Net Master also allows remote Group 1, 2, and 3 facsimile units to transmit documents to 495-I for storage on the personal computer; or a remote personal computer can send files (documents) to a Net Master—equipped personal computer for storage and eventual forwarding to target facsimile units via a 495-I. All in all, it's a very attractive unit, priced at about $7,500 including the 495-I and necessary options.

☐ Strengths

Document distribution is the principal benefit of Scanmaster. Users can create documents on the Scanmaster or at office workstations and distribute them through a Scanmaster network to destinations defined by a routing list. Distributed documents can be routed to other Scanmasters or workstations in the network. Document storage, retrieval, and distribution gives the user the flexibility to control document distribution according to his needs. For example, delayed delivery may be necessary to compensate for time-zone differences, personnel absences, or special announcements, etc. Messages can be stored so that the addressee can retrieve them at his own convenience.

Data compression is also another benefit, for it makes more economical use of the telephone line facilities and speeds overall data transfer. The compression facility, incidentally, is standard on Scanmaster.

IBM is one of the few vendors to offer a data encryption option. For users transmitting sensitive data—especially over the public switched network—encryption is invaluable.

☐ Limitations

By far, Scanmaster's greatest limitation is its incompatibility with other facsimile terminals on the market. Unless the CCITT Group 2 option is specified (RPQ only), Scanmasters communicate only between themselves or the host processor.

While Group 2 provides the missing compatibility, it does so at the price of performance. Under Group 2, it takes 2 **or** 3 minutes to transmit a standard document. IBM offers **no** Group 3 facility at all.

Also missing from Scanmaster is the facility to handle half-tones and high-resolution documents such as fingerprints. The latter weakness is due to the "not so fine" scan-image resolution of this system.

Scanmaster is also a member of the large class of facsimile terminals which cannot automatically adjust to changing scan-image detail. Users set the scan-rate according to the general quality of the document. Since most users will set it for worst-case conditions, unnecessarily long scan times can occur which in turn increases document transmit times. Burroughs dex 6300, NEC Model 2, and Teleautograph Omnifax 99 all have autoscan.

■ SOFTWARE

☐ Terms & Support

All software is bundled except the CICS Image Distribution System, which is offered on a programming request for price quotation (PRPQ).

☐ Operating System

Scanmaster itself has no operating system. The Image Distribution software option, which routes documents to different users, runs as an application program under MVS or DOS/VSE on S/370, 4300, 303X, or 308X processors with CICS/OS/VS or CICS/DOS/VS. VSE/VSAM is required.

☐ Database Management

None provided.

☐ Utilities

Scanmaster provides 2 utilities for routing documents. The first is called Distributed Office Support System (DISOSS/370), which allows office-system workstations like Displaywriter, 8100/DOSF, and the Model 5520 to control facsimile documents in the same manner as text or documents; the second is called the Image Distribution program. This allows users to send or receive documents over dial-up or dedicated phone lines.

DISOSS/370 Version 3 extends library and distribution functions to image documents. It allows storage, retrieval, and document distribution. Document distribution is handled through a cover sheet on which is marked the recipient's address by department number, telephone number, location number, etc; or this information can be retained on a distribution list held in the host processor. For those who do not want to use the distribution cover sheet, the information can be entered via an optional keypad. The cover sheet is placed ahead of the document to be transferred.

IBM's Document Interchange Architecture and Document Content Architecture (DIA/DCA) provide the framework in which DISOSS can perform the necessary transformations to exchange formatted documents. In an interchange, DISOSS stores the document as entered. During a delivery operation, the document is transmitted unaltered if the target workstation is identical to the source workstation. If the receiver is different, DISOSS performs the optional data stream transformation between workstations.

The CICS Image Distribution System allows users to send and receive documents over the public telephone network or dedicated lines. A distribution cover sheet controls routing and distribution. Data communication to the host processor is conducted under CICS control, and all received documents are retained on a direct access storage device. If no errors are detected, a confirmation of acceptance may be returned to the originator as an option. The CICS Image Distribution System is optional, with the price quoted by IBM.

Scanmaster also has the facility to receive and print messages and data generated by host application programs, or generated at other terminals in the network. The unit can also print operational system messages.

 ©1985 Data Decisions

IBM 8815 Scanmaster I Facsimile Terminals
Models 1, 3 & 4

Characters are printed in prestige elite type with a font size of 16x32 dots. Print density is 12.7 cpi and 6.1 lpi. European and Japanese Katakana character sets are offered.

■ HARDWARE

☐ Terms & Support

Terms • all terminals and accessories available on purchase or 1-year rental basis; third-party leases available on 2-, 3-, 4-, and 5-year basis • multiple-purchase discounts offered on following basis: 10 to 39 units, 6 percent; 40 to 74 units, 9 percent; 75 or more units, 12 percent.

Support • on-site, vendor-supplied maintenance billed on monthly basis • first 3 months of maintenance is free of charge.

☐ Overview

Scanmaster, officially called the 8815, is a floorstanding digital transceiver consisting of a controller, scanner, and printer. The controller handles all online and off-line operations, and communicates with another 8815 or host using SNA with Advanced Program-to-Program Communications (APPC) and SDLC. The APPC feature is a new LU-type control, providing common session protocols for documentation interchange among office-oriented systems and products. And, of course, SDLC ensures data integrity through its error-correcting facilities.

The scanner/document feeder offers nothing unusual for transceivers in this class. Image resolution is 203x196 lpi (fine) and 203x98 lpi (standard). The IBM unit employs an automatic feeder with a 30-page capacity, and handles documents ranging from 5 inches wide to 14 inches long. A switch adjusts the machine for normal original/light original.

The printer is a roll-fed, multistylus, electrostatic unit with a dry toner. Received documents are printed and automatically cut to the length of the original. The printing resolution is 203x196/98 lpi (same as the input scanner); print width is 7.87 inches based on a conventional 8.5-inch-wide paper roll. If the user specifies a 98-lpi print resolution, the output document is still printed at the standard 196-lpi speed. Scanmaster prints the same line twice, which degrades throughput times.

Scanmaster provides 2 forms of message routing. The first method, called Image Distribution, is intended for system-attached operation and employs a cover sheet containing preformatted positions for masks indicating scan level for image resolution, input document quality (light or dark), total number of pages to be transmitted, sender identification, and recipient's addresses. A cover sheet must accompany each document. The cover sheet contains 22 rows of boxes and up to 37 boxes per row. A filled-in box by the parameter assigned to it selects the parameter; a blank box is ignored. The mark sense control function reads the cover sheet and transmits the data to the host, which contains the routing tables. Upon receipt of the document, the program will pass data directly to the intended terminal or hold it for later delivery. It will also signal the sending Scanmaster that the document was accepted/delivered. The Image Distribution system is an option, and runs as an application program under MVS or DOS/VSE with CICS/OS/VS or CICS/DOS/VS. VSE/VSAM is required. In addition to the mark sense control, Scanmaster offers a keypad feature which provides a 16-key pad and 10-digit readout on the operator panel to allow entry of document address and/or identification information and password to the host.

The second routing service employs IBM's Distributed Office Support System (DISOSS/370) software which is contained in the host processor's front end. This software permits Scanmaster to run with the Displaywriter, 8100 Distributed Office Support, and 5520 Administrative System. Under DISOSS/370, the user can route documents either by cover sheet or the destination address; delivery time, passwords, etc can be entered via an optional keypad. Documents can be routed directly or deferred.

Scanmaster is offered in 3 models: 8815 Models 1, 3, and 4. Models 1 and 3 operate in terminal-to-terminal/system-to-system modes, while Model 2 operates terminal-to-system. All run under SNA/SDLC, and employ data compression to reduce the volume of data. Model 1 communicates with another Model 1 or a Model 3; the converse applies for Model 3. Model 4 communicates with another Model 4 and a Model 1. All communicate with a 4300, S/370, 303X, or 308X via a 3705.

When Model 3 communicates with an S/370, 4300, 303X, or 308X, the host must be equipped with a 3864 Model 2 or equivalent modem. When Model 3 communicates with another Scanmaster on a terminal-to-terminal basis, the second Scanmaster must be a Model 3; or be a Model 1 equipped with a 3864 Model 2 modem or equivalent.

When a Model 4 communicates with another Scanmaster on a terminal-to-terminal basis, the second Scanmaster must be a Model 4, or a Model 1 equipped with a 3864 Model 1 (or equivalent) modem.

Model 1 runs on a dedicated or switched line at 9600 bps, and requires an external modem interface; a DDS Adapter; or an X.21 Adapter if a dedicated line is being used. Model 3 has an integrated, FCC-registered modem that operates half-duplex over a 2-wire switched line at speeds of 4800/2400 bps. Transmit speed is under operator or system control, and manual originate/answer procedures are used. Model 4 employs an integral 4800-/2400-bps modem which communicates half-duplex over a dedicated 4-wire circuit. Speed selection is under operator, host, and/or remote station control. Data security over switched networks is available through IBM's 3845 data encryption device (see Communications section).

Scanmaster Model 8815

Floor console measuring 35.5 x 19.75 x 29 inches; 284 pounds • input document: 8.5x14 inches; auto-feed with 30-document capacity • output document: roll-fed, 8.5 inches x length of original; 492-foot roll • switch-selectable 203x98-/196-lpi resolution • transmission time of 8.5x11-inch page at 9600 bps is 20 seconds at 203x98 lpi • 7.84-inch maximum scanning width • electrostatic recorder/paper • CCITT Group 2 compatibility optional; no Group 3 compatibility • data compression provided • no half-time support • integral 4800-/2400-bps modem with FCC certification for Models 3 and 4; manual originate and auto-answer to establish connection • mark sense control for addressing and/or identifying documents • character print for printing data, text documents, and messages at 12.7 cpi and 6.1 lpi in prestige-style font.

Scanmaster Model 1 Digital Transceiver • all common basic features • transmits at speeds up to 9600 bps • requires external modem and an external modem interface (3701), a DDS adapter (5650), or an X.21 adapter for dedicated lines (5655) • accommodates keypad feature for keying-in document addressing and/or identification information and password to host:

$600 mo	$11,800 prch	$90 maint

Scanmaster Model 3 Digital Transceiver • contains all common basic features • includes integral modem that operates half-duplex over 2-wire dial-up lines at speeds of 4800/2400 bps • accommodates keypad feature for keying-in document addressing and/or identification information and password to host:

750	14,800	110

Scanmaster Model 4 Digital Transceiver • contains all common basic features • includes integral modem that operates half-duplex over 4-wire dedicated full-duplex facilities in a point-to-point or multipoint arrangement at speeds of 4800/2400 bps:

750	14,800	110

MO: one-year monthly lease charge including maintenance. PRCH: purchase price. MAINT: monthly maintenance charge for purchased units. NA: not available/applicable. All prices shown are single-quantity purchase. Vendor offers quantity discounts. Prices current as of May 1985.

 ©1985 Data Decisions

IBM 8815 Scanmaster I Facsimile Terminals
Models 1, 3 & 4

4610 Keypad • 16-key keypad and 10-digit readout on operator panel • allows entry of document addresses/identification and passwords:

28	550	4

CCITT Group 2 Compatibility • supports communication with analog facsimile terminals that conform to CCITT Group 2 specifications (3-minute transmit/record speeds):

NA	RPQ	NA

☐ Communications

Models 1 and 3 can communicate on a terminal-to-terminal or terminal-to-system basis. Model 4 is used for system-attached operation only. Models 1 and 4 communicate over switched or dedicated facilities, while Model 3 is intended for only the switched network. All employ SNA/SDLC protocol. Scanmaster system attachments are to IBM S/370, 4300, 303X, and 308X via 3705 communication controller or via 4321 or 4331 communications adapter.

Scanmaster Model 1 transmits in half-duplex point-to-point or multipoint modes over dedicated facilities at speeds of 1200/2000/2400/3600/4800/7200/9600 bps. Over the switched (DDD) network, transmission speeds are 1200/2400 bps. Model 1 requires an external modem interface, a DDS adapter, or an X.21 adapter for dedicated lines.

Model 3 transmits in half-duplex, point-to-point mode over switched facilities (DDD network) at speeds of 2400/1200 bps, and 4800/2400 bps over nonswitched lines. This terminal includes a self-clocked, microprocessor-based integral modem that operates over 2-wire switched communication facilities. Interface is RS-232C or CCITT V.24/V.28; satisfies ISO Standard 2110.

Model 4 transmits in half-duplex multipoint or point-to-point mode on dedicated facilities. Transmission speeds are 2400/4800 bps. Model 4 includes an integral, self-clocked, microprocessor-based modem which operates in half-duplex mode over 4-wire dedicated lines. Interface is the same as Model 3.

For security-conscious users, IBM allows its 3845 data encryption device to be attached to the communication line. The 3845 is a tabletop unit positioned between the DTE and DCE, and handles both BSC and SDLC protocols at speeds ranging from 110 to 19.2K bps. The 3845 is transparent to the DCE and DTE. Control signals used by 3845 are redriven in compliance with EIA-CCITT specifications. The 3845 will attach wherever RS-232C/CCITT V.24 interface requirements are met. The 3846, a rackmounted version of the 3845, is also available.

Users that require switched network backup for their dedicated leased lines may implement this requirement via IBM's 3863, 3864, and 3865 modems. Switched backup restores operation between 2 point-to-point modems, or between the central site modem and any multipoint tributary modem.

The time required to transmit a page depends on page length, content, resolution, text format (e.g., number of print characters per line), quality of transmission line, modem speed, speed of scanner and printer, etc. The following table shows typical transmit times for A-, B-, and C-type pages. An A-page contains basic diagrams; B-page is a double-spaced typed letter; and C-page is single-spaced typed text. Transmission is digital; transmission time is increased when operating under optional CCITT Group 2 mode.

PAGE TYPE	RESOLUTIONS SELECTED	TRANSMISSION SPEED (SEC/PAGE) AT LINE SPEEDS OF (BPS) 2400 a	4800 a	4800 b	9600 b
A	Normal	34	19	17	14
	Fine Detail	49	29	27	27
B	Normal	46	26	23	16
	Fine Detail	67	40	37	29
C	Normal	94	52	46	26
	Fine Detail	137	76	69	40

a = switched line; b = leased line

3701 External Modem Interface • internal interface and cable for attaching Model 1 to an external clocked modem with RS-232C interface:

$23 mo	$440 prch	$4 maint

5550 Digital Data Service (DDS) Adapter • interface and cable for attaching Model 1 to AT&T dedicated Dataphone Digital Service (DDS) network at speeds of 2400/4800/9600 bps • interfaces with DDS channel service unit:

45	882	2

5655 X.21 Adapter • interface and cable for attaching Model 1 to X.21 dedicated data circuit-terminating equipment (DCE) at speeds of 2400/4800/9600 bps:

28	800	2

3845 Data Encryption Device • implements data encryption standards conforming to NBS algorithm per publication FIPS 46 (January 1977).

Model 1 • single half-duplex unit operating on 2- or 4-wire circuits under SDLC:

192	2,675	6

Model 2 • dual half-duplex unit; each device completely independent of the other • operates on 2- or 4-wire circuits under SDLC:

313	4,370	8

Model 11 • same as Model 1, except operates under BSC or SDLC:

201	2,765	6

Model 12 • same as Model 2, except operates under BSC or SDLC:

256	4,535	8

• END

©1985 Data Decisions

ICOT 25X CrystaLink Communication Processors
Models 253, 254 & 257

■ PROFILE

Function • network communication nodes that perform protocol and code conversion, line concentration, message/packet switching, message reformatting, multipoint line polling (terminal management), network control, and network statistics reporting • primarily marketed in airline reservations, financial, and retail environments.

Associated Systems/Networks • X.25; IBM, Burroughs, Tandem, and NCR hosts and terminals; also ASCII terminals.

Communications/Networks • maximum configuration supports 5/32/112 9600-bps asynchronous lines or 1/8/28 19.2K-bps lines on Models 253/254/257, respectively • support wide variety of protocols: IBM 3270 BSC; IBM 2780/3780 BSC; PARS; SITA (P1024); IBM SNA/SDLC PU2; X.25; VISA; TINET; Burroughs VS; and NCR 279/725.

Operating System • no software operating system • firmware provides standard and application-dependent program modules.

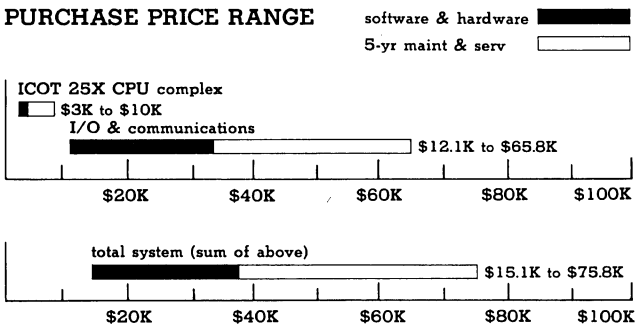
Languages/Program Development • turnkey systems; no languages • unique system parameters stored in nonvolatile RAM (NVR); application uses parameters to customize installation.

Processor • multiple microcomputer systems (Intel 8085 and 8088) implement Line Processors: up to 5 on Model 253, 8 on Model 254, and 28 on Model 257; share system resources, system RAM (32K/64K/128K bytes), and nonvolatile RAM (2K/4K bytes); each Line Processor includes local RAM (2K to 64K bytes) and local PROM (12K to 128K bytes) • 253 is marketed only to existing customers or to new customers using standard configurations; no customizing or new development of 253.

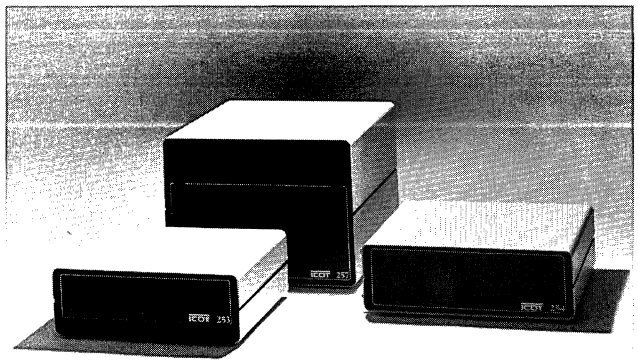
First Delivery • Models 253/254/257: 1981.

Systems Delivered • undisclosed.

PURCHASE PRICE RANGE



ICOT 25X CRYSTALINK PURCHASE PRICING bar graphs illustrate price ranges for small to large systems; solid bars represent hardware and software; open bars represent 5-year service and maintenance fees for large system • **SMALL SYSTEM** is a Credit Authorization and Debit Terminal Concentration System based on the 254 model with 64K bytes of RAM, 8K bytes of PROM, and 2K bytes of nonvolatile RAM in a chassis with 4 slots left over to add LPMs to connect downline communication links to terminals and upline links to hosts; 24 downline links to TINET terminals implemented using 3 asynchronous LPMs (8 lines each); 2 upline links to hosts over X.25 network implemented using 1 bit synchronous LPM • **LARGE SYSTEM** is also a Credit Authorization and Debit Terminal Concentration System based on the 257 model with 64K bytes of RAM, 8K bytes of PROM, and 2K bytes of nonvolatile RAM with 14 slots left over to add LPMs to connect downline communication links to TINET terminals and upline links to hosts; 96 downline links TINET terminals using 3 asynchronous LPMs (8 lines each); 2 upline links to hosts over X.25 network using 1 bit synchronous LPM • software bundled with hardware.



The ICOT 25X CrystaLink permits asynchronous devices to interface with IBM host processors. The controller provides protocol conversion and terminal emulation services.

Comparable Systems • DCA 355 Network Processor; Codex 6010, 6030, and 6040 Intelligent Network Processors; Infotron Supermux 790; IBM Series/1; IBM Retail Store and Financial Controllers.

Vendor • ICOT Corp; 830 Maude Avenue, Mountain View, CA 94043 • 415-964-4635.

Canadian Distribution • through vendor headquarters.

GSA Schedule • unlisted.

Distribution • through direct sales offices located throughout the U.S., through OEM and distributor sales offices, and through corporate headquarters in Mountain View, CA • products marketed internationally through distributors.

■ ANALYSIS

The 25X CrystaLink consists of general-purpose communication processors that support multivendor environments with both multivendor hosts and multivendor terminals. The system provides message switching on a session basis. Thus, a terminal can access a variety of hosts or even a variety of applications within one host. The systems were developed for terminal and circuit concentration in a multivendor network.

ICOT began as a communication vendor to the airlines industry for its reservations systems. This beginning accounts for ICOT's support of the IBM PARS and the SITA (1024B) protocols and its emphasis on message switching in multivendor environments. What is useful for accessing reservation system databases is useful for many other environments.

ICOT's implementation of its system with multiple microprocessors (line processors) that are coordinated and controlled by queues and parameters stored in a shared system memory is simple and innovative. Data does not have to be transported from one microprocessor to another; only memory pointers need to be added to buffer queues. Using one microprocessor per line also makes programming simpler for each microprocessor. It does mean, however, that certain system control programs are replicated in each microprocessor. Despite this, ICOT has not begun to exhaust the expansion capacity of the Intel 8085/8088. ICOT currently uses no more than 128K bytes of the 512K-byte address space in its largest 25X system.

©1985 Data Decisions

ICOT 25X CrystaLink Communication Processors
Models 253, 254 & 257

The systems are flexible and can support any number of terminals on multidropped lines. The only limitation on the number of terminals is buffer space in system RAM.

Currently, the systems are marketed primarily in financial and retail store applications. The systems are flexible and can be configured to implement multiple protocols to allow users to provide new functions using already installed multivendor equipment. Most systems are customized to fit a specific environment. Generally, they are not sold in standard configurations.

No new development is being done on the 253. It is provided to new users only in standard configurations. It is sold primarily to existing customers expanding an installation.

☐ Ease of Use Features

Systems are mostly turnkey so the user has no programming to do. The user must be concerned with the network configuration only: the number of terminals, hosts, applications, protocols, codes, and lines to be supported.

☐ Modes of Operation

The 25X can function as a cluster controller for multidropped terminals, a line concentrator for multiple low-speed lines, a multiplexer/demultiplexer for multiple lines with various protocols and data rates, and a message switcher. It can also combine functions in one system. Networks can be constructed with multiple 25X systems acting as network nodes or as protocol converters/gateways.

☐ Strengths

The greatest strength of the 25X is its versatility in supporting multivendor environments inexpensively with relative simplicity. ICOT has standardized the system interface for its firmware modules so that all modules can coreside in one system compatibly. The systems can be upgraded one to another. Also, the power of the Intel 8088 allows ICOT to develop more powerful systems. Lines and protocols can be added without affecting the basic installed system.

The support of X.25 and of the IBM 3270 in both BSC and SDLC protocols gives ICOT almost universal compatibility because many vendors also support these popular protocols. ICOT has added support for Tandem, Burroughs, and NCR hosts and terminals; systems which are important systems in the transaction processing environment where the 25X is now primarily marketed.

☐ Limitations

The ICOT 25X systems are not general-purpose communications processors. They have become specialized for the airline reservations, banking, and retail sales environments. These are big markets, however, where communications are integral to the business.

■ SOFTWARE

☐ Terms & Support

Terms • unbundled with hardware into a total turnkey system.

Support • bundled with hardware.

☐ Operating System

Software (firmware) for the 25X CrystaLink Line Processor Modules (LPMs) consists of both standard and application-dependent program modules. The standard modules used on all LPMs are the ICOT Communications Executive (ICE) and queuing routines. Other modules handle the protocols used to transmit and receive messages and application-dependent functions. Firmware resides in EPROM on each LPM.

All LPMs can execute the same programs. Any LPM can initialize the system but only one does the initialization.

To allow program modules to be application dependent but usable with each other and the standard system modules, ICOT enforces 2 levels of standardization. One level specifies how LPMs relate to the system resources shared by all LPMs, and how they communicate with each other. The other level specifies the architecture and organization of programs that run in the LPMs.

Firmware is organized into 3 distinct, prioritized layers. The first layer is the physical control layer, used for all LPM applications, to provide character interrupts and executive functions such as initialization routines; it includes the ICE. The second and third layers are the link protocol and application layers programmed to handle specific protocols, standard communication routine functions, and message switching. The application layer uses system parameters stored in nonvolatile RAM (NVR) for unique installation requirements.

The ICE recognizes control character and timing interrupts in all 25X programs and controls background level processing in the LPM. During initialization, the timing interrupt interval for all LPMs is set at 50 milliseconds; the timing interrupt is used by application programs to schedule time dependent functions and to handle time-outs.

All LPMs monitor the communication lines for control messages/commands, which are executed by the LPMs. Thus, network control can be performed from any terminal on the network. System RAM, the primary shared resource of LPMs, is partitioned into 3 logical segments. The fixed memory segment stores system attributes, variables, configuration, and application-dependent tables for message switching and data translation. The line storage segment contains 1 page per LPM; the first few bytes of each page are identical in format and contain information about the processors' line and queues. The other LPMs use this information and the queues for passing messages. The remainder of the page can be used for anything an application requires. The third segment of system memory is buffer memory, which is allocated during initialization into buffers placed in a buffer pool. The free buffer pool is actually a queue of unused buffers.

Individual LPMs use buffers from the pool to store messages received from the line and messages ready for transmission. Buffers are also used to transmit incoming messages from one LPM to another or to store messages during internal processing. Buffers are placed on queues used by destination LPMs for transmission. Transmission lines are double buffered.

☐ Communications/Networks

As a network node, the 25X processor provides protocol conversion, message routing, line concentration and multiplexing, as well as terminal polling on multipoint lines, error control, and address mapping.

Communication with IBM, Burroughs, NCR, and Tandem host systems and other network processors/terminals is by line protocols handled by specifically programmed LPMs (microcomputers). Typically, 1 line from the 25X system communicates with the host processor while a number of "downlines" connect remote terminals. The 25X processor performs code conversion, message switching, and protocol conversion when its lines are attached to multiple local/remote hosts. This allows it to resolve protocol and code set incompatibilities between terminals and hosts in multiprotocol configurations. The 25X can also switch communication lines from multiple terminals to multiple hosts or to multiple application programs in a single host. On multipoint lines, it can act as a cluster controller by selecting and polling attached terminals.

The 25X works within the constraints of protocols used in a particular system. When used for line concentration and protocol conversion, certain ICOT restrictions are imposed on line discipline. Each line on a 25X system operates with the code set stored in its LPM local memory. Code conversion is to a universal code in the receiving LPM, and from the universal code to the code required by the attached host in the LPM handling transmission.

Because each of the multiple LPMs of a 25X system can be programmed to support a particular protocol (bit or byte), various protocols can be supported simultaneously.

Addresses are stored as system parameters in nonvolatile RAM (NVR). Addresses of terminals on multipoint lines are transmitted as part of the data message.

©**1985 Data Decisions**

ICOT 25X CrystaLink Communication Processors
Models 253, 254 & 257

The 25X can translate logical addresses used by the host processors to the physical addresses required by the terminals. Thus, addresses on "uplines" from the host are logical addresses, and addresses on the "downline" to the terminals are physical addresses.

A terminal can be switched between hosts or between applications on a single host as long as the terminal can generate the appropriate logical address. The 25X operates only on complete messages. Switching is done on a session basis in message or packet switch mode. In message mode, the complete message is switched. In packet mode, the message can be divided into segments and each segment enclosed in an envelope with the appropriate header and trailer.

Messages can be any length up to a maximum of 4000 characters. Because all LPMs use the same buffer pool, however, buffer size is fixed for a particular 25X system. Buffer size, however, can vary across 25X systems in a network.

Protocol Conversion • each device transmits in native mode, the 25X converts source protocol to protocol of destination device; text message is unchanged except for code conversion if required; no attempt is made to match functional differences between 2 devices, such as differences between display terminal and printer; device matching must be done by host application program.

IBM 3270 BSC for Single Protocol Environment • available as multipoint controller and multipoint tributary, both can support 3271, 3274, and 3276 control units; all BSC versions on a port must use same protocol; limited conversational mode support.

IBM 3270 BSC for Multiprotocol Environment • available in multipoint controller, multipoint tributary, and point-to-point versions; supports 3271, 3274, and 3276 control units; multipoint tributaries can be 3270 or 3780 terminals; point-to-point can be over leased or dial-up lines, transmission is like 3780 or 2780 point-to-point; limited conversational mode support in multipoint protocols.

IBM-SDLC in Multiprotocol Environment • available in primary and secondary station versions; primary station functions like an IBM 370X controller on multidropped leased line, controls all transmissions on link; secondary station functions like remote 3271 on multidropped line; supports EBCDIC character set now; will support ASCII text later, transparent text optional; operates in half-duplex mode over leased lines.

Asynchronous ASCII for Multiprotocol Environment • generalized asynchronous ASCII support; supports specialized asynchronous protocols such as IBM 2260, VISA, TINET, NCR, and Burroughs Poll/Select.

IBM Programmed Airline Reservation System (PARS) Protocol • translates PARS character set (6-bit code) to universal code (U-code); implemented as control and tributary stations on a multipoint data link.

SITA (P1024B) for Multiprotocol Environments • uses ATA/IATA character-oriented Synchronous Link Control (SLC) procedure P1024B; user can select ASCII or BCD for Type A traffic and ASCII or Baudot for Type B traffic; supports single and multichannel links.

Burroughs, NCR & Tandem Host & Terminal Protocols • supported in both BSC and asynchronous versions.

X.25 Interface • allows communication between hosts/terminals using X.25 packet-switched network.

Code Conversion • translates code received on an input line into Universal Code (U-Code); destination LPM translates U-code to specific code used by devise receiving data • code sets supported: IBM 3271/3275 EBCDIC, IBM 3274/3276 EBCDIC, IBM ASCII, ANSI ASCII, ATA/IATA PARS, and Baudot.

Line Concentration • as line concentrator, can receive input from incoming terminal lines and reduce output to 1 or more high-speed lines.

Message Switching • can route message from any line to any other line in the network; uses configuration table to route data; supports switching terminal messages between host and between applications in host, each host application requires separate link between 25X and host • handled on a session basis; operates with line concentration and protocol conversion.

Message Reformatting • messages are received on an input line within a particular envelope; in a single protocol environment the message is unchanged and its envelope unchanged; in a multiprotocol environment, the envelope is stripped off and the code translated into U-code before it is sent to the output Line Processor, which translates the U-code to the specific code required by attached device and surrounds it with the appropriate envelope.

Multipoint Line Polling • provides facilities of a cluster controller for attached terminals • every terminal system resides in 1 of 3 states: fast poll is active state and device is polled at maximum rate; slow poll is time-out state and device is polled only once for each 10 times active terminals are polled; no poll is inactive state and 25X does not poll terminal until host system commands it to resume polling.

Network Control • functions provided to help user control the network include control messages, statistics gathering, diagnostics, and fail/safe recovery.

Control Messages • can be entered from any device on system if command includes system password; any line processor can execute the control command if it conforms to control message format • control messages can perform the following functions: control configuration, report configuration, assign channels, report statistics, assign password, stop/start polling, echo (route all received data back to sender), and reset system.

Statistics Gathering • 25X collects data on traffic on all lines, both traffic in and out, and number of errors; statistics gathered on command and transmitted for network analysis.

Diagnostics • 4 routines test system resources and all line processors; can be initiated from system console on front panel, from the host by a command message, or from an administrative terminal connected to one of the line processors.

Fail-Safe Recovery • automatic recovery attempt to recover from internal errors: no buffers available to buffer messages, illegal buffer address, or illogical operation sequence • system resets channel or whole system and re-executes program that had data loss.

☐ Program Development

Vendor supplies firmware to implement applications. Specific configuration data, password, configuration table, logical address conversion tables, line speeds, and so on stored in system memory. Standard routines are provided but most systems are customized to fit user environment.

■ HARDWARE

☐ Terms & Support

Terms • turnkey systems available for purchase only; can be custom coded using standard modules or unique modules.

Support • monthly on-site maintenance varies from 1 to 2% of total system price; configuration dependent • repair of modules returned to service depot is flat rate per module; about $100 per module • ICOT has third-party NCR service engineers working out of 70 locations.

☐ System Overview

The 25X CrystaLink Series of Communication Processors consists of 3 compatible models: Models 253, Model 254, and 257. Each system is composed of multiple microcomputers called Line Processor Modules (LPMs), which are programmed to control multiple lines; they support a mixture of bit- and byte-oriented synchronous or asynchronous protocols. Maximum line support depends on which LPMs are selected. The 253/254/257 can support up to 5/32/112 9600-bps asynchronous lines; or 1/8/28 19.2K-bps bit synchronous lines, respectively.

The LPM (communication board) has its own local memory and serial interface, and is programmed to handle either a bit- or byte-oriented protocol for the line it supports. Line Processor Modules share the system's RAM accessed through the system's

 ©1985 Data Decisions

ICOT 25X CrystaLink Communication Processors
Models 253, 254 & 257

interprocessor bus, facilitating exchange of messages between lines of dissimilar protocols. Different LPMs are used by the 253 and the 254/257 models.

The memory module is integrated into Model 253's single circuit board along with the Bus Controller that handles the system's 5 lines. However, Models 254 and 257 require the Processor Management Subsystem or ICOBUS (memory/timing board) and a diagnostic subsystem or diagnostic terminal. The ICOBUS provides each LPM with shared memory resources and timing interrupt; it can provide the Bus Controller for the 254/257 models; the memory board also includes nonvolatile RAM (NVR) and data rate generators.

The firmware in the 253/254/257 is implemented in 3 distinct layers: physical control, link protocol, and application layers. All are programmed to perform executive functions and handle character interrupts in the physical layer. The link protocol and application levels are programmed to handle specific protocols and special application requirements.

☐ Packaged Systems

Model 253 • being phased out; no new developments planned for it • single circuit board containing 4/5 microcomputers (LPMs) and providing up to 32K bytes of RAM, 8K bytes of PROM, and 256K bytes of nonvolatile RAM (NVR) shared by up to 5 LPMs; each LPM has 2K bytes of RAM, up to 12K bytes of PROM, and a serial line interface (RS-232C or RS-422) • each LPM supports a full-duplex line, up to 9600 bps using byte asynchronous or synchronous protocol • system memory board also includes 256 bytes of nonvolatile RAM for storing system parameters used in initialization • maximum line support is five 9600-bps lines; transmission is in byte synchronous or asynchronous mode.

Model 254 • contains a circuit board for system memory and timing, plus up to 4 additional communication boards (LPMs) housed in single 5-slot chassis • communication boards are configured with an 8-bit microprocessor that includes PROM, RAM, an interrupt controller, 1 baud rate generator, and a serial interface that converts between serial data and characters, supplies data set controls, and supports half-/full-duplex point-to-point or multipoint communication • 2 Line Processor Modules (LPMs) are available: bit synchronous and asynchronous • the bit synchronous LPM can connect up to two 19.2K-bps bit synchronous or byte synchronous lines; the interface is either RS-232C or RS-422; 4K to 16K bytes of local RAM and 16K or 32K bytes of local PROM are provided for each LPM • the asynchronous LPM can connect up to eight 1200-bps asynchronous lines; the line interface is RS-232C; up to 64K bytes of RAM and 128K bytes of PROM are provided for each LPM • a previously available byte synchronous LPM is no longer supported.

Model 257 • similar to Model 254, except can support up to 14 LPMs in its 15-slot chassis; uses same byte synchronous, bit synchronous, and asynchronous LPMs as 254 • can support up to 112 asynchronous lines at 1200 bps, 28 synchronous at 19.2K bps, or combinations of the 2 types of lines.

IBM SNA/SDLC Environment System • available in secondary station version emulating SNA Physical Unit (PU) Types 1 and 2 devices or Logical Unit (LU) Types 1, 2, and 3; available on Models 254 and 257 only.

Basic 254 Model: **$3,000 prch**

Basic 257 Model: **5,000**

Each Port Implemented: **1,700**

Credit Authorization & Delist Terminal Concentration • for dial-up VISA network and multidropped leased line TINET terminals to financial hosts communicating in BSC, SNA/SDLC, or X.25 protocol.

Basic 254 Model: **3,000**

Basic 257 Model: **5,000**

8-Line VISA Interface: **2,200**

8-Line TINET Interface: **2,600**

BSC Line Interface: **1,100**

SNA/SDLC Line Interface: **1,700**

X.25 Network Interface: **1,700**

Point-of-Sale Device Concentration & Protocol Conversion System • enables a variety of point-of-sale (POS) devices and electronic cash registers (ECRs) using asynchronous, NCR 279, NCR 725, or BSC protocols to communicate with NCR or IBM hosts.

Basic 254 Model: **3,000**

Basic 257 Model: **5,000**

NCR 279 Interface (Async or BSC): **1,100**

NCR 725 Interface (Async or BSC): **1,100**

IBM BSC Protocol: **1,100**

ATM Concentration System • ATMs using IBM BSC or Burroughs Poll/Select protocol communicating to Tandem or IBM hosts; in addition to concentration functions, 25X performs local polling of the ATMs reducing polling overhead on hosts and reducing bandwidth required on the common links.

Basic 254 Model: **3,000**

Basic 257 Model: **5,000**

IBM BSC Interface: **1,100**

Burroughs Poll/Select Interface: **1,100**

Tandem BSC Interface: **1,100**

IBM BSC Interface: **1,100**

X.25 PAD • interfaces BSC 3270, BSC 3780, and SNA PU2 devices to X.25 network with terminal and/or host PAD(s).

Basic 254 Model: **3,000**

Basic 257 Model: **5,000**

BSC 3270 Device Interface: **1,100**

BSC 3780 Device Interface: **1,100**

SNA PU2 Device Interface: **1,700**

PRCH: single-unit purchase price. Prices effective as of August 1985.

©1985 Data Decisions

ICOT 25X CrystaLink Communication Processors
Models 253, 254 & 257

X.25 Network Interface:

1,700

5000 Series • financial/retail and network gateway products developed for specific applications products on the 25X CrystaLink.

5210 BSC Processor • a Network Gateway that allows a host with IBM 2780/3780 BSC point-to-point protocol to communicate with another host that supports only BSC 3270 terminals • appears to host as native 3270 terminal:

4,300

5220 Inter-Host Processor • a Network Gateway that permits the communication of 2 IBM hosts that support 3270 BSC terminals • 5220 appears to be an IBM 3270 cluster controller with 32 attached terminals to both hosts:

6,300

5250 Dial Point-of-Sale Concentrator • combines line concentration and protocol conversion for VISA dial-up credit authorization and debit terminals • concentrates 8 incoming dial-up ports into a high-speed BSC 3270 line to a host • appears to host as an IBM 3271 controller with 8 devices attached and operating at speeds up to 9600 bps:

6,300

5330 ATM Concentrator • handles over 100 ATMs communicating in async Burroughs Poll/Select protocol over 6 lines concentrated into 2 high-speed BSC point-to-point line to a host; reduces line charges (6 lines to 2 lines) and performs remote polling of the ATMs • appears to host as an IBM 2780/3780 device operating at up to 9600 bps:

6,300

☐ CPU & Memory

CPU is implemented with an Intel 8085 or 8088 microprocessor. Address limit is 512K bytes of memory, but ICOT 25 uses a maximum 128K-byte address space. System 253 is a single circuit board containing memory module, bus controller, and supports 5 Line Processors; it has pushbuttons and 8 LEDs on external panel to display diagnostic output. Models 254 and 257 require the Processor Management Subsystem or ICOBUS, which is a memory/timing board that occupies 1 slot on system chassis. Model 254 chassis with 5 slots supports 4 Line Processors and Memory Board. Model 257 chassis with 15 slots supports 14 Line Processors and Memory Board.

253/254/257 System Memory • Model 253 supports 32K-byte RAM on the system's single circuit board plus 8K bytes of PROM and 256 bytes of nonvolatile RAM • Models 254/257 each support 64K-/128K-byte RAM with ECC (error-correcting circuitry) on the ICOBUS (memory/timing board), plus up to 8K PROM and 2K/4K bytes of nonvolatile RAM (NVR); occupies 1 slot on the system chassis • system memory is the primary shared resource among Line Processors; logically, memory is divided into 3 distinct segments during initialization: Fixed Memory, Line Storage, and Buffer Memory • Fixed Memory is used to store system attributes and variables as well as system-wide table for message routing and data translation • Line Storage contains a memory page for each Line Processor in the system; the first several bytes are identical in format on each page and contain processor information about line and queues • Buffer Memory is used by individual Line Processor on as-needed basis.

253/254/257 LPM Memory • 12K (253) to 128K (254/257) bytes of PROM and 2K (253) to 64K (254/257) bytes of RAM located at end of PROM, used as local scratch pad.

☐ I/O Channels

Each synchronous line or group of asynchronous lines has its own Line Processor, which can access the systems RAM through 25X Interprocessor Bus. The Interprocessor Bus and Bus Controller handle interconnection, scheduling, and data transfer between the Line Processors. Channels supporting IBM or Sperry protocols provide host-to-terminal or terminal-to-host connections.

Channel numbers correspond to ports: 1-5 on Model 253; 1-8 on Model 254; and 1-28 on Model 257. Each channel represents a line type. Each line emulates a host in communication with a terminal; uses physical address of attached terminal to perform protocol functions such as poll, receive, and transmit messages. Upline channels emulate terminal communicating with host; host uses logical addresses to exchange messages; logical address corresponds to a physical address of a terminal attached with downline.

☐ Communications

The 25X CrystaLink Models 253, 254, and 257 accommodate up to 5/32/128 asynchronous (9600 bps) or 5/12/42 synchronous (9600 bps) or 0/8/28 synchronous (19.2K bps) lines, respectively, in a single cabinet. The ICOT 25X processors operate within constraint of protocols used in each system; the ICOT 25X processors can be configured in point-to-point and multipoint polled networks. Each line operates with code set that corresponds to specific protocols involved. Currently supported protocols include IBM 3270 BSC, IBM 2780/3780, IBM BSC, 3271 SDLC, IBM SNA/SDLC Physical Unit 2, X.25, NCR 279, NCR 725, industry-specific protocols such as PARS and SITA P1024, TTY, as well as asynchronous ASCII. Protocol support cost is usually $1,100 per port for all protocols except asynchronous ($275 per port) and $1,700 per port for SNA/SDLC and X.25.

ICOT 25X systems interface to communication lines through modems or modem eliminators (RS-232 and RS-422).

• END

 ©1985 Data Decisions

ICOT 35X & 36X Virtual Terminal Systems
Models 351, 352, 361 & 362

■ PROFILE

Function • emulates IBM 3271/3274 remote controllers and 3277/3278/3279/3284 terminals and printers • substitutes ASCII terminals/printers for IBM units • performs terminal management and control; performs polling, data concentration, and network control.

Packaging • standalone, tabletop unit attaching 6 (351), 12 (352), 8 (361), or 16 (362) terminals/printers.

Communications/Networks • supports single or dual high-speed links; BSC/SDLC; 9600 or 19.2K bps • attaches to IBM 270X and 37XX communications processors; used with IBM S/360, S/370, 30XX, and 43XX processors • RS-232C, RS-422, or 20-mA current-loop interface for DTE; RS-232C DCE interface.

First Delivery • 1981 (352), 1982 (351), 1984 (361/362).

Systems Delivered • undisclosed.

Comparable Systems • Black Box A/S-3, CCI 8274C, Datastream 7741/874/776, DRA Hydra II, Infotron VTS 351/352, Innovative Electronics MC80/600/602, Kaufman Data 870/872, Local Data DataLynx/3274, Micom Micro 7400, Protocol Computers 1071/171/71B, Renex RT74, Thomas Engineering MZ-80, etc.

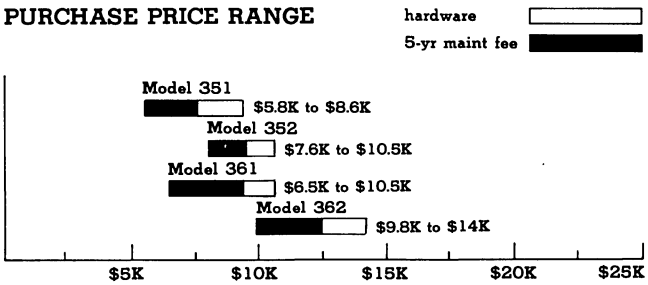
Vendor • ICOT Corp; 830 Maude Avenue, Mountain View, CA 94043 • 415-964-4635.

Distribution • through direct sales offices located throughout U.S. and through distributors domestically and internationally.

■ ANALYSIS

The ICOT 35X and 36X remote cluster controllers fall into a category of products called "protocol converters." That term, however, is a misnomer for these products; they are actually **terminal and controller emulators**. However, like protocol converters, these devices are an important cost-saving alternative to IBM products for users who now or plan to operate within an IBM BSC and/or SNA/SDLC environment. They eliminate the added cost of IBM products and protect the users' investment in existing ASCII terminals.

PURCHASE PRICE RANGE



ICOT 35X/36X PURCHASE PRICING bar graphs cover price ranges between "small" and "large" configurations for hardware (solid bars) and associated 5-year maintenance (open bars) • Model 351 **small** configuration is for basic unit supporting 6 I/O ports and a high-speed link; **large** configuration adds second high-speed link • Model 352 **small** configuration is for basic unit supporting 12 I/O ports and a high-speed link; **large** configuration adds second high-speed link • Model 361 **small** configuration is for basic unit supporting 8 I/O ports and a high-speed link; **large** configuration adds second high-speed link • Model 362 **small** configuration is for basic unit supporting 16 I/O ports and a high-speed link; **large** configuration adds second high-speed link • all prices single-quantity purchase.

The 35X Series consists of the 351 and 352 Virtual Terminal Systems, 2 products designed to emulate the IBM 3271 Models 2 and 12 cluster controllers. The 3271 is one of the original controllers associated with IBM's ubiquitous 3270 Information Display System. It can accommodate a total of 32 devices, including Model 3277, 3278, 3279 terminals and a series of printers including the 3284. The 351 and 352 do not attach IBM peripherals; rather, they accommodate lower-cost ASCII terminals and printers and emulate the display, print, edit, and control characteristics of the more expensive IBM products. The ICOT controllers also do not support 32 peripherals; the 351 attaches 6 terminals and printers, and the 352 attaches 12.

The 36X Series is comprised of the 361 and 362 Virtual Terminal Systems. These units emulate the IBM 3274-51C cluster controller and, like the 35X, employs ASCII terminals/printers in place of the aforementioned IBM products. The 361 attaches 8 peripherals and the 361 handles 16. In addition to standard dumb ASCII devices, the 36X also interfaces any personal computer with "glass teletype" characteristics.

Products like the 35X and 36X are marketed as low-cost alternatives to the more expensive IBM products. The cluster controllers always cost far less than comparable IBM units, and the ASCII terminals can cost only one-third to one-quarter as much as an IBM keyboard-display. For example, IBM's low-cost 3178, priced at $1,660, could be replaced by a host of $500 terminals on the market. Likewise, available ASCII printers are priced far below IBM's 3284, provided you can find one. The 3284, like the 3271 controllers, have long since been dropped from the IBM product line.

While price is a primary factor in choosing between IBM and products like these, additional operating capabilities is another. Just about all of the IBM 3270 replacement product vendors offer facilities not available from Big Blue. In the case of ICOT, the difference is in a multihost communication facility and the ability to handle remote dial-in terminals. The advantages of these enhancements are discussed under **Strengths**.

 ©1984 Data Decisions

ICOT 35X & 36X Virtual Terminal Systems
Models 351, 352, 361 & 362

With both price and performance superiority, it is surprising why products like the 35X and 36X haven't blown away IBM. There are a number of reasons, including user unawareness of the alternative products and the security umbrella associated with buying only IBM products. Another reason, however, is **efficiency**. Any product that emulates another and/or performs protocol conversion has built-in overhead in time and resources to execute the conversion. For these ICOT products, emulation and protocol conversion makes an ASCII terminal "appear as" and "behave as" an IBM 3277/3278/3279 terminal as far as data presentation, edit, and control are concerned, and in converting the ASCII character stream into a 3277/3278/3279 format. To emulate the operating characteristics, ICOT employs **Parsing Tables** to convert ASCII keyboard commands into 3270 commands. Since the ASCII keyboard probably does not have edit and control keys corresponding to those employed by 3270 keyboards, users must key-in a predetermined set of keystrokes to effect the desired 3270 command. For example, to clear the screen requires a single keystroke on an IBM keyboard. To accomplish the same thing with a DEC VT100 emulating a 3278, the user must depress the ESC key followed by an R. To do the same with a Hazeltine (Esprit) terminal, the CTL and W keys must be depressed. With the 3270, there are some 30 different operations plus 24 programmed functions that can be initiated with a single keystroke or a combined shift operation and keystroke. With ICOT and everyone else **at least 2** keystrokes are required.

The actual keyboard-command emulation is fairly rapid, since firmware executes the process. The inefficiency is at the operator level. Someone accustomed to using an IBM keyboard must learn a completely new keying pattern, and this often leads to reduced keying speeds and quite often keying errors. Even after the operator learns and becomes accustomed to the patterns, it still takes more time to enter multiple keystrokes. Another limiting factor is that some of these replacement products do not emulate the more sophisticated features of the 3270. For example, a "Read Modified Data Only" operation is not always supported, nor is the full complement of program function and program address keys. ICOT claims that all 3270 functions are supported by both controller series.

The 3270 emulation code is in firmware and therefore not field-alterable without changing PROMs. IBM, on the other hand, employs a diskette for system software, making changes a lot easier.

In summary, products like the ICOT controllers do offer a low-cost alternative to IBM and, in many cases, provide useful features not available on the 3270. The multiple keying operations, however, will cut throughput efficiency. The user should carefully examine the tradeoffs to determine whether they justify the cost.

☐ Strengths

Both controllers support dual high-speed links, remote terminal dial-in, and expanded operations, none of which is offered by IBM on any of its controllers.

The dual-link facility is optional on all units and allows the cluster controller to directly communicate with 2 independent hosts or 2 separate ports on the same front-end processor. In addition, the dual links can be the same or different protocols (BSC/SDLC), thus further enhancing the overall flexibility of the product. The dual communication facility is concurrent, and users may switch from one to another via a simple keyboard command. There is no logging on or off as is the case with some products. Users may even put a session on hold, switch links to perform another function, or retrieve data, and switch back to the on-hold session.

The remote terminal dial-in facility is not unique to ICOT (other "protocol" converters have it as well), but it does not exist on the IBM 3270. Remote dial-in allows users to configure certain controller ports to recognize the data rate and character format of a remote terminal dialing into the controller, and establish a session for it. For organizations with remote users requiring only occasional host-processor services, the dial-in facility is a low-cost solution. Without it, the remote site would need its own cluster controller or something that emulates it.

Some of the expanded operations provided by ICOT include the aforementioned capability to switch sessions without having to log on and off and the ability to hold a session. In addition to these, both controllers provide a redraw facility whereby the user can locally store the previously displayed page in buffer and recall it. While IBM does not have this capability on any of its controllers, it does provide a 7680-character buffer on its 3180 Model 1 terminal, which accommodates 1920-character screens.

☐ Limitations

The principal limitations of the ICOT products are the limited terminal/printer handling facilities, and the inability to directly connect to a local host. The 351/352 emulate the IBM 3271, a product that can accommodate up to 32 peripherals. The ICOT units, however, provide ports for 6 or 12 devices, which is severely limited in view of the device emulated. We are also puzzled why ICOT hasn't introduced something a little more modern, like a 3274-21C, -31C, -41C, with 32 ports. As the line currently stands, users with requirements greater than 12 terminals/printers must move to the ICOT 362, an IBM 3274-51C emulator with 16 ports.

The 35X and 36X are strictly remote controllers that interface with a 27XX or 37XX communications processor. Nothing is offered for local host connection to the byte or block multiplexer or selector channels on the host processor. Since both controllers have a dual-link facility, a useful enhancement would be the use of one for direct local connection. Lee Data Corporation offers such a controller with its Models 321 and 421, and we understand that it has been very successful. Of course, there's nothing to stop you from making a local connection via a modem to the communications processor.

While not necessarily a limitation, users should be aware that neither controller series includes redundant logic or power supplies. Thus, a failure of either disables the entire controller and its associated terminals.

■ SOFTWARE

☐ Terms & Support

Terms • firmware control bundled into basic system price.

Support • bundled with hardware.

■ HARDWARE

☐ Terms & Support

Terms • offered on a purchase basis only • $375 installation charge per site regardless of number of 35X/36X units ordered • 30-day free trial, but user pays installation charge; credited if unit is purchased.

Support • on-site service • maintenance charge is typically 1 percent per month of unit purchase price • ICOT and third-party service engineers.

☐ Overview

The 35X/36X Series consists of 4 clustered-terminal controllers that emulate the IBM 3271 Models 1 and 2 (351/352) or IBM 3274-51C (361/362) controllers with 3277/3278/3279 terminals and 3284 printers attached. The ICOT controllers permit any combination of up to 16 asynchronous ASCII terminals and printers to be substituted for the IBM units; emulates their display and print characteristics and edit, format, and control functions. All of the ICOT controllers can be configured with up to 2 independent high-speed links for communicating with separate host processors, or different ports on an IBM 27XX or 37XX communication processor. Users can switch between links directly from the keyboard.

While the 35X/36X Series are delivered with the necessary firmware to execute emulation, users must configure the operating parameters for each ASCII port. From a keyboard, the user enters the line speed, word format, ID echo indicator, line type, and authorized user ID. Line speeds can be selected at 50/75/110/150/200/300/600/1200/1800/2000/2400/3600/4800/7200/9600 bps, or the auto-baud (auto-speed) detection facility may be specified if the access terminal is connected to the controller via a remote communication facility. The word format indicates the number of active bits, parity, and

 ©1984 Data Decisions

ICOT 35X & 36X Virtual Terminal Systems
Models 351, 352, 361 & 362

stop bits. This, too, can be automatically detected for dial-in terminals. The echo ID allows the user to specify if his ID is to be echoed back during sign-on for security reasons. The line type indicates local (direct attachment), leased line, or auto-answer. Receive-only printers can be assigned to auto-answer ports as long as they are not part of a hunt group (rotary). All configuration parameters are retained in nonvolatile RAM to ensure system integrity during a power failure.

The printer definition specifies line count and line length, page length, and width. A carriage return pad count is maintained to support unbuffered terminals; for unattended printers a flow-control (XOFF) timeout is provided.

The 351 and 352 controllers attach up to 6 and 12 terminals, respectively, while the 361 and 362 accommodate 8 and 16, respectively. However, since all controllers can be configured with 2 high-speed independent links, accessed alternatively by the attached terminals, users must configure for sessions on each link. The total number of concurrent sessions permitted depends on the size of the terminal transmit/receive buffer and the number of characters to be displayed on each screen. The 351/352 controllers contain 24K bytes of buffer RAM and the 361/362 contain 64K bytes. The IBM terminals emulated are the 3277-1 and -2, the 3278-1 through -5, and the 3279-2A and -3A, which have display characteristics of 960/1920/2560/3564 characters per screen. Therefore, the total number of concurrent active sessions supported by the 35X and 36X Series based on their respective 24K- and 64K-byte buffer capacities is:

Characters Displayed	Maximum Sessions 35X	36X
960	25	66
1920	12	33
2560	9	25
3440	7	18
3564	6	17

These limits are the total number available to **both** links, not each link. Buffer space allocated to link 1 is subtracted from that available for link 2.

The standard 351 and 352 controllers each contain a high-speed, 9600-bps BSC link. A second BSC link or an SDLC link operating at 19.2K bps is optional. The 361 and 362 also contain a single high-speed link, but it is an SNA/SDLC link operating at 19.2K bps. An SNA/SDLC link or a BSC link operating at 9600 bps is optional.

Dual link facilities are not available on the IBM 3270. The 35X and 36X also contain operational facilities not offered by the IBM controller. These include **Add Session**, a feature that allows the user to establish a concurrent second session on the same or different host; an **Exchange Session**, a feature that allows the user to alternate between sessions without logging off either session; and **Quiet Session**, a feature that allows the user to terminate one or both concurrent sessions. The ICOT controllers also allow locally initiated printing operations.

A form of local page storage is provided by a redraw facility, which allows the user to store the previously displayed page and recall it from buffer storage. However, IBM offers up to 4 locally stored pages with its 3180 Model 1 terminal.

☐ Converters/Emulators

Model 351 • tabletop, standalone remote cluster controller supporting up to 6 ASCII terminals/printers in any combination • emulates IBM 3271 Models 2 and 12 with attached terminal models 3277-1 and -2, 3278-1 through -5, 3279-2A/3A (base color only) and/or 3284-1 and -2 printers • RS-232C, RS-422, or 20-mA current-loop interfaces • remote dial-in with ABR/CFD • 32K-byte RAM; 8K-byte PROM; 2304-byte nonvolatile RAM (NVR) • single high-speed trunk, 9600 bps, BSC; optional second BSC or SDLC trunk:

$5,800 prch	$5.80 maint

Model 352 • same as 351 except supports 12 ASCII terminals/printers:

7,600	7.60

Model 361 • tabletop, standalone remote cluster controller supporting up to 8 ASCII terminals, personal computers, or printers in any combination • emulates IBM 3274-51C controller with attached terminal models 3277-1 and -2, 3278-1 through -5, 3279-2A/-3A (base color only) and/or 3284-1 and -2 printers • RS-232C or RS-422 interfaces • remote dial-in with ABR/CFD • 64K-byte RAM; 8K-byte PROM; 2304-byte nonvolatile RAM (NVR) • single high-speed trunk, 19.2K bps, SNA/SDLC; optional second SDLC or BSC trunk:

6,500	6.50

Model 362 • same as 361 except supports 16 ASCII terminals, personal computers, or printers:

9,800	9.80

☐ Terminals/Printers

The 351/352 is delivered with emulation firmware that accommodates most commercially available asynchronous ASCII terminals and printers. The vendor specifically mentions the Lear Siegler ADM, ADDS, Regent 20/25/40/60/100/200, IBM 3101, Telex 310, DEC VT52/100, Televideo, and Hazeltine (all models). The terminals must contain an RS-232C, RS-422, or 20-mA current-loop interface. The 361 and 312 support the same terminals, plus any personal computer that operates in a "glass teletype" mode (e.g., Apple, Tandy, etc).

The 35X will accommodate any serial ASCII printer (receive-only or keyboard send/receive, buffered, or unbuffered). Each printer operates as a host-addressable system printer, a shared printer, or local copy printer.

The 35X emulates IBM terminal models 3277, 3278, and 3279 (see Converter/Emulator); and IBM 3287-1 and -2 printers. According to the vendor, all display, editing, and control functions for these IBM devices are supported via passing tables and multiple keystrokes.

☐ Communications

The controllers attach up to 16 ASCII terminals/printers via RS-232C, RS-422, or 20-mA current-loop interfaces. Any serial ASCII printer that supports XON/XOFF control signals is acceptable.

The terminals can be directly collocated to the 35X, up to the limits of the interface. For RS-232C, RS-422, and 20-mA interfaces, the distances are 50, 4,000, and 2,000 feet, respectively. For greater distances, a null modem or line driver is required. The 35X/36X also support remote terminal dial-in whereby a leased line or the DDD can be used to access the controller. Both series have auto-baud recognition (ABR) and character format detection (CFD), allowing the controller to automatically "setup" to handle the incoming data. The maximum transmit speed for a remote terminal is 1800 bps; for a locally connected device, the maximum speed is 9600 bps. The 35X/36X also provide local and remote flow control (XON/XOFF) to ensure that transmit/receive buffer capacity is not exceeded, causing data to be lost.

The 35X/36X Series communicate with IBM S/360, S/370, 303X, and 43XX processors via 27XX or 37XX front-end processors, or integrated communications adapters on the S/370 Models 115, 125, 135 or 138, and the 4331. Communication is point-to-point under either BSC or SNA/SDLC protocols at speeds of 9600 bps (BSC) or 19.2K bps (SDLC). All models of the 35X/36X support a second high-speed link to either the same or different host processor. Users have a choice between BSC or SDLC protocol to control the second link. Both links operate simultaneously, and allow users to switch between them via keyboard command.

PRCH: single-unit purchase price. MAINT: monthly maintenance charge. All prices current as of November 1984.

 ©1984 Data Decisions

ICOT 35X & 36X Virtual Terminal Systems
Models 351, 352, 361 & 362

351/352 Optional BSC Trunk • microprocessor-controlled optional high-speed trunk for 351/352 controller • concentrates the outputs of up to 12 terminals • BSC protocol; 9600 bps:

$1,500 prch	$15.00 maint

351/352 Optional SDLC Trunk • same as above, except employs SDLC and transmits at 19.2K bps:

1,500	15.00

361/362 Optional SDLC Trunk • microprocessor-controlled optional high-speed trunk for 361/362 controllers • concentrates the outputs of up to 16 terminals • SDLC protocol; 19.2K bps:

2,250	22.50

361/362 Optional BSC Trunk • same as above except employs BSC and transmits at 9600 bps:

2,250	22.50

• END

©1984 Data Decisions

Infinet EMS-One & Series 90
Network Control, Management Reporting & Performance Measurement System

■ PROFILE

Function • network control system (EMS-One), network management reporting system (90/10), and performance measurement (90/15) • See Figure 1.

Communications/Networks • supports 8 to 152 4-wire dedicated Type 3002 lines in 8-line increments • accommodates up to 10 line segments per diagnostic channel • addresses 60,800 drops (modem addresses) maximum; 40 drops per line segment maximum • accommodates Infinet NCM or older MCS Series modems or non-Infinet modems equipped for network control • 75-bps secondary channel supports network control functions.

First Delivery • 1979 (EMS-One/Series 90); 1981 (90/10); 1984 (90/15).

Systems Delivered • over 300.

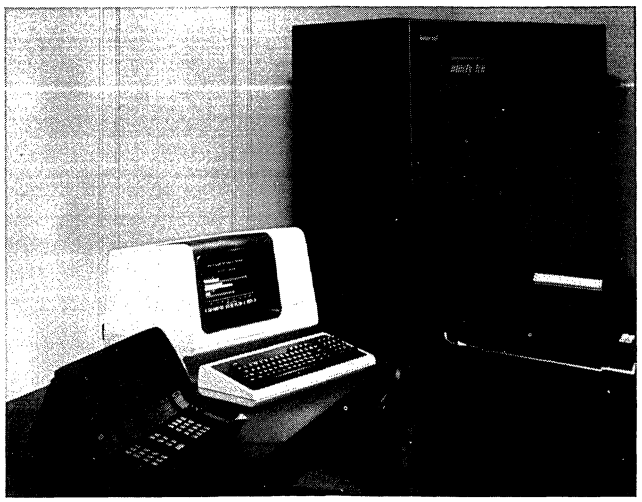
Comparable Systems • principal competition from AT&T-IS Dataphone II Service, Codex Distributed Network Control System (DNCS), General DataComm Netcon 6, IBM 3860 Series modems with NPDA software product, Paradyne ANALYSIS 5500 Series, Racal-Milgo CMS 185, CMS 2000 Systems.

Vendor • Infinet Inc; Six Shattuck Road, Andover, MA 01810 • 617-681-0600.

Distribution • nationwide via local Infinet direct sales offices • Great Britain via Data Logic Ltd, London • Belgium, Luxembourg, The Netherlands via Stock Control International, The Netherlands.

■ ANALYSIS

Perhaps the most significant development in the EMS-One/Series 90 over the last year involved a corporate name change. To avoid further confusion with Phoenix-based telephone system supplier Inter-Tel and to reflect an expanding product line, Infinet changed its name to Infinet, Inc in December 1983. The product itself was left relatively unchanged: Infinet increased the line monitoring capacity for the 90/15 performance measurement system from 16 to 32 lines. Pricing remained stable.

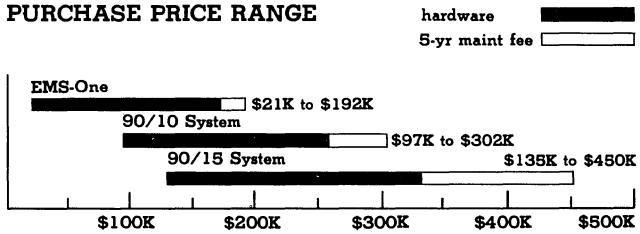


The Infinet EMS-One/Series 90 is one of the more prominent network control, management, and performance measurement systems on the market. Like competitive systems, it addresses network supervision through continuous surveillance for line or component failures and degradation, remedial recovery procedures, and diagnostic testing to insure network integrity and isolate failures. Unlike most competitive systems, it also supports automatic diagnostic testing and reporting scheduled during inactive communication periods to spot existing or potential failures so that remedial action can be taken before communications activity resumes. This is a significant step toward the elimination of downtime. Failures can be resolved before they are discovered by the user, and potential failures from component or line degradation can be spotted and resolved to eliminate unnecessary retransmissions that reduce communication efficiency, and ultimately result in a hard failure.

Also, unlike with some competitive systems, the user can add administrative support with the 90/10, a database management system that produces management reports from network operating statistics. It supplies the network manager with information to evaluate network performance, analyze trends, and automate time-consuming administrative tasks.

Performance monitoring and response time measurement, another major enhancement to EMS-One/Series 90, was introduced at the Interface 82 show as the 90/15 system. This hardware/software turnkey system supplies the network manager with information to spot performance degradation, study traffic loading, to reach decisions on resource reallocation to optimize network performance, and to evaluate future network expansion. The benefits derived from the 90/15 enhancement complement those of the 90/10 management reporting system, and the basic network control system. The combined systems comprehensively address the total needs of the network manager, providing the means to keep a finger on the pulse of the network and to plan for future expansion to accommodate growth and

PURCHASE PRICE RANGE



INFINET EMS-ONE, 90/10 & 10/15 PURCHASE PRICING bar graphs cover price ranges between "small" and "large" configurations for hardware (solid bars) and for associated 5-year maintenance fees (open bars) • **small EMS-ONE** configuration consists of 8-line ACC800 kernel system including CP750 controller, op console, and printer plus single SP750 Satellite Processor and 8 IP750 Interface Processors (does not include modems); **large EMS-One** configuration consists of 152-line CP750 controller plus 4 op consoles, 4 printers, 20 SP750 Satellite Processors, and 152 IP750 Interface Processors • **small 90/10** configuration consists of small 8-line EMS-One configuration plus 90/10 subsystem; **large** of 152-line EMS-One system plus 90/10 subsystem • **small 90/15** configuration consists of 16-line EMS-One system, 90/10 subsystem, and 16-line 90/15 subsystem; **large** of 152-line EMS-One system, 90/10 subsystem, and 32-line 90/15 subsystem.

 ©1984 Data Decisions

Infinet EMS-One & Series 90
Network Control, Management Reporting & Performance Measurement System

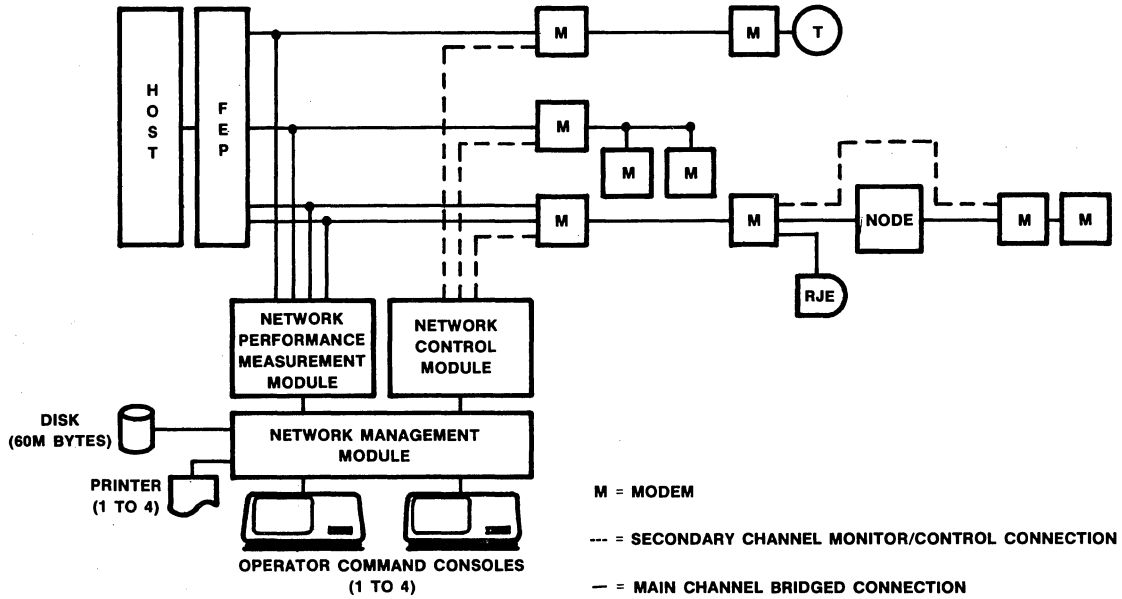


Figure 1 • EMS-One configuration with 90/10 & 90/15 subsystems.

increased productivity. Although openly promoted, the 90/15 is still in Beta test and won't be commercially available until October 1984.

Infinet pioneered the network control concept and has dedicated itself to network control since 1973, when it introduced its first system, the MPT 500, designed for failure isolation and remedial recovery. Infinet introduced a more sophisticated successor to its MPT 500 in early 1976. The NCS 4000 Network Control System offered extended user benefits through a broader range of capabilities. It enabled the user to pinpoint failures within the network through extensive diagnostic testing and to minimize downtime through remedial recovery procedures. And it was designed to accommodate large and more complex networks, with as many as 4,000 drops and multiple hub sites and tail circuits.

The EMS-One Network Control System is a third-generation product introduced in late 1978. It embodies the basic concepts of the NCS 4000, but is superior in performance and capability. The key benefits of the EMS-One system are ease of use by relatively unskilled personnel, and the elimination or minimization of downtime through automated procedures for failure detection and isolation, and rapid recovery. Operator prompting, a functionally divided console screen, color-coded keys, abnormal condition alarms and reporting, and automated test procedures make the system easy to use by operators who do not need a thorough understanding of data communications technology. Degrading conditions or failures are quickly detected when they occur during continuous network surveillance, and downtime can be eliminated or minimized through remedial recovery procedures such as hot spare modem switching or dial backup, or by disabling a streaming terminal.

Infinet has gained visibility as a leader in network control through the installation of over 300 systems since its inception. EMS-One/Series 90 installations include major New York and Philadelphia banks, prominent airlines, a leading drug chain, and a large rail carrier.

☐ Strengths

The EMS-One/Series 90 system is designed for configuration flexibility and ease of expansion to meet present and future user requirements. Modular components can be added to satisfy expanding network requirements without replacing existing ones. The maximum line and addressable site capacities are substantial to accommodate large networks. A second EMS-One processor with associated satellite processors is required when line and drop capacities are exceeded. System port increments are small for cost effectiveness. Users needn't pay extra for additional ports that exceed the number of lines in their networks.

Operator console and printer support is also flexible to satisfy small-to-large-scale network requirements. Consoles and printers can be added as needed, and they don't have to be located at the central site. The user can place them where they are most effective, which may be at one or more remote locations serviced by a dedicated line.

One of the prime advantages of the EMS-One/Series 90 system is that it can accommodate non-Infinet modems. This is important to users with leased modems that are still under lease, or to users that may be satisfied with modem performance and vendor support provided by other manufacturers.

Ease of operation by a relatively unskilled operator is another important consideration. Highly skilled technicians are not necessary to operate the system. Little training is required because operation is simplified through displayed prompting messages that assist the console operator and well formatted tabular information presented for ease of understanding.

The Automatic Preventative Maintenance (APM) mode, not available with many competitive network control systems, can be extremely useful to the network manager. It identifies and pinpoints degrading conditions and failures within the network through continuous diagnostic tests run during inactive periods, such as after normal business hours. During APM, test data is transmitted over the user's primary data channels. Test results are logged and a printed copy is available to the console operator at the beginning of normal business hours. The console operator can examine the results and take immediate remedial action by contacting the telephone company or appropriate service personnel to re-establish normal communications. Extensive downtime is eliminated, failures are discovered before attempted usage, slow degradation can be identified and remedied before a hard failure occurs, and most important, users remain satisfied.

 ©1984 Data Decisions

Infinet EMS-One & Series 90
Network Control, Management Reporting & Performance Measurement System

The user can mask specific operating parameters and disable selected sites to be ignored by network surveillance. These user benefits prevent alarms from known conditions. For example, DTE power can be masked during certain hours when a terminal is shut down, or signal quality can be masked until a logged degradation condition is remedied. The user can disable a site from network surveillance when the site is shut down or under service. Masked parameters and disabled sites are listed in files so the user doesn't lose track of them. The file contents can be reviewed on the console screen or a printed copy can be produced for reference.

Although Infinet must duplicate diagnostic control signals for multichannel modems or tail circuits, like other network control vendors, users must address modem drops according to port, line, and modem address for each line segment. Therefore, the system "knows" what modems belong to which lines, unlike some competitive systems that treat modem addresses on multichannel lines of tail circuits as if they existed on only one dedicated circuit.

The 90/10 Network Management Reports option eliminates manual administrative tasks such as writing and tracking trouble tickets, searching historical files for performance data, and locating vendor and telco contacts. The option makes it much easier and more effective to handle administrative data, especially when vital information such as a contact name or site information is needed in a hurry.

The 90/15 Performance Measurement and Reporting option, designed to monitor IBM SDLC and 3270 BSC protocols, is a significant improvement to the EMS-One/Series 90 system and a valuable asset to the user. It alerts the user to emergency conditions immediately as they occur so that excessive downtime can be eliminated through immediate action. During user-specified report interval, it acquires four categories of protocol-related information: traffic counts, line utilization, transmission error counts, and response time (data transmission time, CPU wait time). Armed with this information, a network manager can locate bottlenecks on a data line, improve network performance and productivity, evaluate the effect of new host application software, and plan for network expansion.

☐ Limitations

The most significant limitation of EMS-One/Series 90 is shared by all network control systems employing sideband diagnostic circuits. They cannot be used over all-digital transmission facilities or satellite links. Hybrid or wide-area network users can only employ EMS-One/Series 90 over that portion of their networks traversing dedicated, voice-grade circuits. Infinet is addressing network control over AT&T DDS facilities, however, through a recently introduced DSU (Data Service Unit) and a forthcoming central-site controller with intrusive diagnostics.

The Series 90/10 data management package is the DEC Datatrieve data access and retrieval facility. Datatrieve does not have the power of a true DBMS; it incorporates fixed files and formats, and is more difficult to use. Paradyne's new ANALYSIS 5530 network control system reportedly supports a relational DBMS for user-definable reporting structures, and may be a more effective alternative for some users.

Other inherent limitations are not as profound. The system supports up to 40 addresses per line (10 lines per port), which is not necessarily the number of drops it supports on a multipoint line. Drops which include 2 modems, a primary and a hot spare modem, require 2 addresses, one for each modem. Infinet has lifted this limitation with its newer NCM Series modems; an integral spare modem uses the same address as its companion primary modem.

Analog parameters monitored by the system are **by no means comprehensive**. EMS-One/Series 90 monitors receive line level and receive signal quality **only**. The Codex DNCS and Paradyne ANALYSIS, by comparison, monitors a number of additional analog parameters such as phase jitter and hits, impulse noise, harmonic distortion, etc, and can also monitor 2 user-specified parameters.

All masks (monitored parameters to be ignored) cannot be established for individual sites. EMS-One/Series 90 masks specified parameters for all sites with the same port address. Therefore, a parameter masked for a specific site with known circumstances is ignored for all remaining sites with the same port address. This is a limitation of the extremely small RAM memory capacity of the EMS-One/Series 90, and is resolved with the addition of the 90/10 option.

The 90/15 Performance Measurement and Reporting option is currently limited to 32 lines. Large network users with a need for performance monitoring must decide which lines within the network support critical communication activity and should be monitored for performance.

Infinet's maintenance is performed largely through third parties. Third-party maintenance is not the same as direct vendor support where the vendor is totally in control and can be more responsive to customer needs. It is conceivable that third-party maintenance could become a weak link in the customer-vendor relationship.

■ SOFTWARE

☐ Terms & Support

Terms • EMS-One/Series 90 firmware Control Program is bundled with hardware system pricing; software and firmware for 90/10 and 90/15 subsystems are also bundled with hardware system pricing.

Support • software support service is included in monthly lease and maintenance for purchased units under Hardware section.

☐ Operating System

The EMS-One/Series 90 runs under proprietary operating systems; incorporates Digital Equipment Corporation's Datatrieve data management software.

☐ EMS-One Control Program

System Control

System control is performed by operating system firmware under the direction of the console operator through keyed commands, operating parameters, and system information; system executes commands entered into operator console keyboard and interacts with operators through displayed prompts, error messages, responses to commands, test results, file contents, alarm reports, and system/network status • master console initializes system; all consoles operate independently • keyswitch lock for system security enables/disables system; also prevents unauthorized changes to system operating parameters while system enabled.

System Commands • initialize system; create and modify entries in system activity files; display or print system activity file contents; print copy of display screen.

Diagnostic Commands • conduct individual qualitative and quantitative tests at selected sites and abort tests; automatically conducts scheduled series of quantitative tests and prints results.

Monitor Commands • enable/disable automatic monitor mode; display or print alarm status (abnormal conditions that exceed threshold values) of current faults • alarm reports automatically logged on system printer as they occur • disable system printer • mask commands suppress/enable alarm reports between user-specified time intervals for specific monitored parameters.

Status Commands • display dynamic status of individual EIA interface leads for specific device; results updated 37 times per second • display status snapshot of individual EIA interface leads for specific device or display dynamic status of selected interface lead on EIA interface of specific device.

Remedial Commands • control switching primary data path between dedicated line and dial backup lines at specified device; hot spare modem switching at specified device; and disables terminal streaming through inhibiting terminal's RTS.

Utility Commands • set time and date; print screen contents (copy display).

Network Surveillance

Network surveillance is performed continuously in the Automatic Monitor (AM) mode during active communication periods without

 ©1984 Data Decisions

Infinet EMS-One & Series 90
Network Control, Management Reporting & Performance Measurement System

interfering with network activity. Digital and analog modem and line conditions for devices contained in a polling list (Network Listing File) are monitored for status changes (pass-to-fail or fail-to-pass) according to vendor-established threshold parameters. Monitored analog conditions include receive line level and receive signal quality; the remaining monitored conditions include steady inbound carrier, streaming terminal, streaming terminal disabled, terminal power, and no response to poll. The operator is immediately alerted to detected abnormality (alarm condition) both audibly and visually (a displayed fault count is incremented and an alarm is sounded) and the fault is added to the Current Faults File and logged on the printer by fault type, location in network, and the date and time of occurrence. The alarm requires operator acknowledgement to insure operator attention. The operator responds to the alarm by appropriate remedial recovery, conducting specific diagnostic tests, and alerting maintenance personnel. The operator is also alerted to a connected failure by an audible alarm and a decremented displayed fault count. The reported failure is also removed from the Current Faults File when the condition is normalized and fault correction is logged on the printer by fault type, address, and date and time of correction. The operator can display or print the contents of the Current Fault File for review or referral as needed.

System Activity Files

Six RAM memory resident files store network activity information. The files are accessible and can be modified through the operator console. Operator access can be disabled by a keyswitch lock on the console for system security. The file contents is displayable for review and analysis or printed for referral at operator command.

Network Listing File • maps entire network automatically through polling at operator command; contains port/line/drop address of each modem in network; updated automatically by operator command or manually through console keyboard to reflect added or deleted sites • automatic mapping clears all system files and interrupts network diagnostic control.

Current Faults File • accumulates detected network abnormalities (alarms) as they occur; each entry includes fault type, port/line/drop address, and date and time of occurrence; entry automatically deleted when fault corrected.

Disabled Sites File • maintains a list of sites not to be monitored during network surveillance (AM mode); sites can be tested during Automatic Preventative Maintenance (APM) diagnostic mode • each entry is port/line/drop address of disabled site; entries added or deleted through console keyboard.

Hot Spare Modem Location File • maintains port/line/drop address of all hot spare (standby) modems in network; automatic mapping or manual entry/deletion through console keyboard.

AM Mask File • maintains a list of parameters to be ignored for specific ports (line corrections at central site) during Automatic Monitor (AM) mode, masks valid only during operator-designated time periods, or constantly.

APM Schedule File • maintains list of diagnostic tests to be executed during Automatic Preventative Maintenance mode; entries include test identity, port/line/drop address, test starting time, and test length • AM masks and disabled sites ignored by APM testing; test entries added/deleted through console keyboard.

Diagnostic Tests

Diagnostic test procedures isolate and identify failures or degradation in network lines or components • specific diagnostic tests of designated components and lines executed at console operator command in Manual (MAN) mode • operator scheduled series of qualitative and quantitative tests automatically executed at designated times in Automatic Preventative Maintenance (APM) mode; test results listed on system printer • APM mode testing interrupts normal communications; must be conducted during inactive periods.

MAN Mode Tests • comprehensive set of off-line quantitative and qualitative modem and line performance tests • analog quantitative tests measure signal quality as related to error rate and signal level (dBm) • signal quality test measures signal quality of designated 4800-/9600-bps transmitting remote modem at receiving central-site modem • signal-level test measures reference signal level transmitted from and received by central-site modem via loop at designated remote modem; test also measures level of signal transmitted from designated remote modem at central-site modem • comprehensive set of steady state bit error rate tests (BERT) provide quantitative measurements of line quality • generated test bit pattern selectable from 10K to 10M bits in length • BERT tests conducted end-to-end, out bound, or simultaneously between central-site modem and designated remote modem and between hub site and designated remote modem • tests conducted with/without injected errors • switched-carrier block error rate test (BLERT) conducted inbound from designated remote modem to central site modem; number of blocks selectable from 10 to 10K • block with single bit error counted as block error • BERT and BLERT errors displayed at operator console • modem self-test with/without errors • modem analog loopback.

APM Mode Tests • bit error rate tests (BERT) automatically conducted in APM mode under direction of APM schedule in APM Schedule file • operator selectable schedule parameters specify long (100K bits) or short (10K bits) test duration, specific port address or all ports, and starting time (hour/minute); all sites (including spare modems) tested on selected ports • 4 quantitative tests with pass/fail results; modem self-test with/without injected errors; outbound and inbound line error tests with/without injected errors • 7 qualitative tests • 2 transmit/receive steady-state bit error rate (BERT) tests measure bit error rate over outbound/inbound lines • dynamic (block) error rate (BLERT) test selectable at 10 or 100 blocks • 3 analog tests; received signal level at central-site modem compared with known transmitted level from remote site modem, or from central-site modem looped back via analog loopback at remote site modem; receive signal level at remote site modem calculated with respect to known level transmitted from central-site modem • signal quality test relates approximate bit error rate to measured signal voltage at central-site modem.

Remedial Recovery

Remedial recovery procedures restore communication interrupted by line outages or degradation, modem failure, or terminal streaming conditions until faulty condition is corrected • recovery procedures conducted by console operator through keyed commands • dial backup and hot spare modem switching restore communication interrupted by line outage or degradation or by modem failure • terminal streaming, a prolonged or continuous Request-To-Send (RTS) signal, monopolizes a multiport line preventing communication between host CPU and other terminals on the same line; communication restored by disabling modem until condition is corrected.

Dial Backup • supports central site and remote sites • central-site unit provides dial backup or 9 drops on a multipoint line; bridges 9 dial backup line pairs onto single 4-wire line to central-site modem • remote-site auto-answer unit switches modem between 4-wire dedicated line and 2 dial-up lines to restore communication interrupted by line failure or degradation; automatically answers call on DDD lines and switches modes from dedicated to dial-up lines under console operator command; operator enters port/line/drop address of calling unit and number of unit to be called; operator alerted to busy condition or no dial backup option • operator switches dial backup unit from dial-up to dedicated lines without terminating (hanging up) DDD call until dedicated line restoration is established.

Hot Spare Modem Switching • switches data terminal equipment and 4-wire dedicated line between faulty modem and hot spare (backup) modem under console operator command; restores communication interrupted by modem failure or degradation.

Streaming Recovery • disables streaming terminal under console operator commands by inhibiting RTS signal from terminal interface, preventing the addressed terminal from causing a continuous carrier which interrupts communication between other terminals and central site • RTS automatically unblocked when signal switches up.

©1984 Data Decisions

Infinet EMS-One & Series 90

Network Control, Management Reporting & Performance Measurement System

☐ Management Reports

Management reporting, performed by the 90/10 Network Management System, eliminates manual administrative tasks including creating historical files for analysis of performance data, writing and tracking trouble tickets, review of current network status, and producing/maintaining site information records.

Management reports are accessed through the management operator console (available in color or monochrome) using the Report Generator, which displays a menu listing 7 report categories, each selectable from the menu item number. Once the report category is selected, prompts (nested menus) enable selection of data by site address, time and date of entry, or by fault or test type. Additional prompts enable selection of data by specified sort sequence and the format in which it is to be displayed or printed. Data can be sorted by port/line/drop site address, logical site name, time/date, or fault/test type.

Screen Utilities & Screen Editor

Utilities enable selective viewing, addition, deletion, and revision of individual records or groups of records in various Network Management Module files.

Administrative Utilities • used to add, delete, or revise information in specific network sites • comment utility enables deletion or display of user comments on specific sites; comment file can be displayed or printed in sequence by port/line/drop address or logical site name.

Trouble Ticket Utilities • used to create, delete, revise, and display trouble tickets • utilities used to create trouble tickets as network problems are discovered, update a trouble ticket as troubleshooting progresses, and close the record when the problem is resolved.

Help Utility • contains detailed narrative explaining commands, function keys, and operation of Network Management Module.

Other Utilities • assist operator with routine system maintenance.

Screen Editor • displays a blank form such as site or trouble ticket report with protected and unprotected fields highlighted in color • assists operator entering data in blank fields by automatically inserting site information (provided that it exists in the 90/10 database); provides functions to make data manipulation and insertion easier • performs data entry/validity checking; entry is checked and system forces operator to correct an invalid entry before continuing.

System Security & Restoral

Unauthorized operators are prevented from entering or deleting data in the management files through read-only access to the screen editor, report generator, and report writer packages. Authorization requires an account number or password to be entered during the log-on procedure. A special password is required to access a high-level software and operating system maintenance and troubleshooting package.

In the event of power loss to the network control or management module, power restoration routines automatically initialize system and reload files. During power-up of the network control module, all system files are automatically accessed from the management module disks and reloaded into the system.

Current Network Status

Real-Time Status • constantly displays real-time network status at bottom 6 lines of screen to make operator aware of network problems while viewing and generating reports • displays day, date, total faults outstanding, and total number of trouble tickets outstanding in double-height/double-width letters; also displays number of locations where fault time threshold is exceeded, number of locations where fault count threshold is exceeded, and total number of trouble tickets which remain open past their time thresholds • system messages displayed and scrolled up from bottom; messages include change of state (F to P/P to F), power loss and error messages, and current time and fault thresholds exceeded (displayed in dual-intensity blinking format), plus any changes to system files entered through diagnostic console • also displays step-by-step tracking of downline loading process.

Current Fault Information • displays outstanding faults in port/line/drop order; each entry includes site address and name, fault type, date and time of fault origin; displays total number of current faults at bottom.

Current Fault Thresholds • utility allows operator to set fault count and fault time thresholds for each site • each displayed entry includes port/line/drop address, site name, current fault count, fault count threshold, accumulates fault time, elapsed fault time for current fault, and fault time threshold.

Network Administration

Maintains individual site reports that contain vital site characteristics and information that may be needed in an emergency, such as contact name, telephone number, dial backup number, and critical site comments.

Network Site Report • comprehensive description of network site; contains 26 fixed items of administration and technical information, 20 individual site fault masks, fault count and time threshold information, and a 120-character critical comments field • administrative and technical information includes port/line/drop address, site name, site mailing address, contact name and telephone number, open/close time, site type (central/hub/remote), modem speed, terminal address/type, dial backup telephone numbers, hot spare status, site status, system address, comment flag, and application • comment utility access comment file to delete, add, or display comments; comments added via screen editor; up to 10 pages of comments stored per site; independent reports listing site comments can be generated by site address (port/line/drop) or logical site name • template feature stores 26 operator-designed templates; template can be superimposed on comment page of any network site record; applications include inventory listings, financial information, strap lists, or block diagrams.

Summarized Network Site Report • summarizes network site information; single site entry per line; all sites reported • contains logical site name, port/line/drop address, site restoration dial backup telephone numbers, site open/close times, contact telephone number, site status—(A) active/(I) inactive/(D) disabled/spare modem provided, and the availability (yes/no) of site comments • total sites listed at bottom of report.

Historic Event Reporting

Monitored network parameters changes resulting in fault reports produced during Automatic Monitor mode (AM) are passed to the 90/10 management system and recorded on disk for reference. Each fault record contains the fault type, date and time of occurrence, port/line/drop address of the fault, elapsed time to resolve fault, and date and time fault was resolved. This information is available as needed and can be displayed on the 90/10 management terminal and/or printed. The events can be sorted and listed chronologically, by port/line/drop address, site name, fault type, or any combination of these.

Port/Line/Drop AM Event Report • failures sorted and listed in order by port/line/drop address • entries include fail date and time, pass date and time, port/line/drop address, logical site name, and elapsed fault time; multiple events for same site address listed chronologically • listing includes all sites or only sites specified by beginning and ending site addresses • report summary includes average failure time (total site fault time divided by total number of events), total failure time (all sites listed), maximum and minimum failure times, and total number of events listed.

Logical Site Name Event Report • failures sorted and listed alphabetically by logical site name over a selectable time interval • information supplied for each event identical to Port/Line/Drop AM Event Report except also includes fault type.

Failure Type Event Report • failures sorted and listed by type of failure over a selectable time interval • multiple failures of same type listed chronologically by failure start time • information supplied for each event identical to Logical Site Name Event Report.

Chronological Event Report • failures sorted and listed in

 ©1984 Data Decisions

Infinet EMS-One & Series 90
Network Control, Management Reporting & Performance Measurement System

chronological order over selectable date and time interval • lists overlapping fault time per site • information supplied identical with Logical Site Name Event Report.

Chronological Event Report • failures sorted and listed in chronological order over selectable date and time interval • lists non-overlapping fault time per site • information supplied identical with Logical Site Name Event Report.

Nested Event Report • nested, sort, and listing of failures; events listed in sequence by port/line/drop address; events per site listed chronologically and then by failure type • selectable date and time interval • information supplied identical with Logical Site Name Event Report.

Network Maintenance

Quantitative test results obtained from tests conducted in the Automatic Preventative Maintenance (APM) mode are stored in an APM history file. Reports can be tailored to key on specific parameters for monitoring performance trends. These reports alert personnel to degrading performance so that preventative maintenance can be performed before a hard failure occurs. The reports can be produced over a specified time period for specified network sites.

Trouble tickets are produced by the 90/10 operator, stored online, revised as problem analysis proceeds, and are available for later analysis and performance reporting. The operator is alerted to an open trouble ticket that remains open beyond a user-definable threshold via audible and visual alarms.

APM Schedule Report • lists parts to be tested, the time test sequence is to be executed, and the test type (long or short) • all lines and drops tested per selected port.

APM Report • sorts and lists test results of APM quantitative tests in sequence by port/line/drop address • report also includes date and time of report and total APM events reported.

APM Single Site Report • chronologically sorts and lists all APM test results that exceed user-selected thresholds • report contains logical site name, port/line/drop address, time test conducted, and test results • report summary lists time and date of report, selected threshold values, and total APM events reported.

Trouble Ticket Display • trouble ticket creation, revision, monitoring, and closing performed from 90/10 operator console via utilities • new trouble tickets automatically assigned unique reference number when opened to avoid duplication • audible/visual alarms alert operator to trouble tickets open past an operator-established time threshold • operator closes trouble ticket when problem resolved and initiates calculation of elapsed open ticket time.

Trouble Ticket Report • summarizes open trouble tickets over given period of time • useful for situations such as shift changes where new shift obtains hard copy of open (unresolved) problems • records of closed trouble tickets remain online for later review and possible inclusion in summarized network repair reports; repair time automatically calculated and stored for future reference.

Graphical Analysis

Graphic presentation of information vital to network performance makes it easy to quickly spot problems. Graphic analysis reports display information in color in a bar chart format.

Fault Time vs Port • color bar chart display presents total failure time in hours accumulated at each port during a given time interval; threshold levels keyed by color.

Fault Time vs Port/Line/Drop • color bar chart display presents total failure time in hours for specific lines and drops on a particular port.

Fault Time vs Fault Type • color bar chart display presents total failure time in hours for each type of failure at a specific port/line/drop address.

☐ Performance Measurement & Reporting

Network performance monitoring and measurement alerts the user to catastrophic conditions or severe performance degradation, and conducts performance measurement and reporting for network performance analysis via the 90/15 system and associated software.

Performance Alerting Monitoring (PAM)

PAM messages alert the operator to catastrophic conditions (measured over 1-minute intervals) that include loss of response from a communication controller or line monitoring unit, or a polling failure in the communication controller. They also alert the operator to performance degradation (measured over 5-minute intervals and compared to a user-defined threshold) for response time, number of retransmissions inbound/outbound, and number of transmission errors inbound. A PAM message contains line address/controller/device, alert type and parameter value, threshold value, and time/date of sensed condition.

Response Time • measured in seconds as accumulated value of average FEPs poll-to-poll time, poll-to-terminal response time, terminal inbound message time, CPU wait time and CPU outbound message transmission time • CPU wait time defined as message processing time measured from receipt of complete input message to commencement of outbound response • response time alert occurs when percentage of transaction responses exceed user-established threshold.

Outbound Retransmissions • alert signals the percentage of retransmitted information frames on the outbound link has exceeded the user-established threshold.

Inbound Retransmissions • alert signals the percentage of retransmitted information frames on the inbound link has exceeded the user-established threshold.

Inbound Transmission Errors • alert signals the percentage of frame check sequence errors on inbound link has exceeded the user-established threshold.

Periodic Performance Measurement (PPM)

Main channel is continuously monitored to calculate average response times with respect to error counts, line utilization, transactions, and other statistical parameters. These calculations, executed over a user-defined report interval (minimum of one-half hour to a 4-hour maximum), are useful for spotting long-term performance trends and line utilization to assess the impact of expansion and reallocate resources to optimize network performance. Results are available on demand either as a printed report or displayed bar chart.

Outstanding Alert Status • presents number of alerts reported by PAM not yet cleared from system.

Alert History • summation of all previous (cleared) alerts; can be retrieved by line, control unit address, device address, and time.

Error Counts • related to variety of transmission errors; covers "no responses" from control unit, number of retransmissions outbound and inbound, number of singular and consecutive no-response conditions and aborted transmissions (inbound and outbound).

Traffic Counts • complete picture of all components involved in transactions • details, according to control unit, number of transactions over user-specified time interval.

Line Utilization • presents percentage of utilization for specified line during user-established interval; can be sorted by controller and provides both inbound and outbound statistics.

Response Time & Transactions • details response time and CPU wait time including average response time, threshold setting, percentage over threshold, and number of transactions; retrieved by device and time interval.

Performance measurements also include 3 bar charts displayed on the color operator console. These charts can be related to a specific line, controller, and in some cases, device. Information can be retrieved according to user-specified time (month, week, day, and hour).

Response Time • presents aggregate average response time, its threshold value, CPU wait time, and percentage of transactions with response times over threshold.

©1984 Data Decisions

Infinet EMS-One & Series 90

Network Control, Management Reporting & Performance Measurement System

Transaction Count • presents number of transactions for any device; user-specified time window.

Percentage of Transactions Over Threshold • presents percentage of transactions with response time over pre-established threshold, and percentage with CPU wait time over threshold.

System Security

Data file and access security is established by user codes and passwords. A security program, accessible to a single, designated user, individually establishes and controls each operator's access to files and report generating functions. The same program also routinely tracks and records system access on an operator-by-operator basis. Operator access privileges are handled on an individual basis and are easily and quickly alterable.

■ HARDWARE

□ Terms & Support

Terms • available for purchase or for lease under 2-, 3-, 4-, or 5-year agreement; separate maintenance agreement available for leased or purchased equipment • lease/purchase credit is 50 percent of lease paid out up to 50 percent of purchase price for 1- or 2-year lease; 3 or more years at 60 percent of monthly lease up to maximum of 70 percent of purchase price • 1-year warranty for purchased units • quantity discounts available for purchased or leased units.

Support • installed by Infinet; typically requires 2 days; charge varies with configuration and distance from service center • 3 service plans available; maintenance performed under maintenance agreement, on per call basis or factory service; contract and per call maintenance performed during normal business hours 8:30 AM to 5:00 PM, Monday through Friday except holidays; maintenance during hours outside prime shift available for contract maintenance only and only in certain areas • per call maintenance filled for time, materials, and travel expenses • factory service available for purchased equipment only; service billed for repair or replacement; repair or replacement at no cost for equipment under warranty; turnaround within 30 days • nationwide service through Infinet and third-party service representatives including Dow Jones and Western Union at over 300 service centers in 47 states and 3 locations in Canada • service response time quoted at 4 hours within 50 miles of service center; 8 hours between 51 and 100 miles, and best-effort basis over 100 miles • advice and troubleshooting assistance during normal business hours through Infinet Field Service National Technical Support Group, Andover, MA; 800-343-8144.

□ Overview

The EMS-One/Series 90 supervises network performance through network surveillance, diagnostic testing, and remedial failure recovery. Network surveillance is performed continuously in the Automatic Monitoring (AM) mode during active communication periods without interfering with network activity. Digital and analog modem, and line parameters are monitored for change-of-state conditions with respect to Infinet-established operating thresholds. These conditions immediately alert the console operator, are logged on the console printer, and are added or deleted from the current faults system file; failure conditions are added to the file, normalized conditions delete existing failure entries. Each file entry includes time and date of entry; port, line, and drop address of parameter change; the monitored parameter, and its altered status.

The EMS-One/Series 90 supports multichannel modems connected to backbone circuits as well as tail circuits in multitier environments. The system can support up to 10 line segments, or individual Type 3002 circuits, in up to 4 successive tiers. Tiers are defined as backbone circuits, parallel channels emanating from multichannel modems, or individual tail circuits. At each tier, diagnostic control signals must be duplicated for additional line segments through the Test Sharing Device (TSD) 500.

Extensive diagnostic testing of the entire network is performed automatically during inactive communications periods in the Automatic Preventative Maintenance (APM) mode. A scheduled series of quantitative tests are run, and the results are printed for review and remedial action by the console operator at the beginning of an active period. Test result entries include time and date, port/line/drop address of test location, and test results. APM test scheduling is an operator function. Schedules include starting time, test length (long or short), and ports to be tested.

System operation is controlled by the console operator through keyed commands and system prompts. System related operator functions include setting time and date, compiling or modifying a network listing of all sites, identifying disabled sites and hot spare modem locations, specifying AM masks, and scheduling APM diagnostic testing. System-related information is stored in system files within RAM memory and is accessible for display or printing. The Network Listing file contains a port/line/drop address for each modem in the network and is automatically constructed or updated with the execution of a learn command. The console operator can add or delete sites to or from the Network Listing file as required.

The Disabled Site file contains addresses of all sites not to be monitored in the AM mode. Sites can be added or deleted as required. Hot spare modem locations are learned automatically when the Network Listing file is constructed, but can be operator modified as required. The AM Mask file lists specific parameters that are to be ignored in the AM mode for all sites with a defined port address for a specified time period. The operator can review and modify the content of system files via the console CRT screen and print copies of the files as needed.

The console operator can measure the performance of modems and lines through individual qualitative and quantitative diagnostic tests performed to detect failure or degradation. These tests interfere with normal communications activity on the main channel, and must be conducted during an inactive period, typically to troubleshoot network faults that may have interrupted normal communications.

The console operator can also monitor operating conditions at a selected site for abnormalities. Monitoring is conducted during normal network activity without interfering with main channel communications. A status snapshop displays the momentary pass/fail status of a specific set of operating parameters at a selected site. The dynamic status of specific parameters of the set for a selected site can be displayed until manually terminated. Also, the dynamic high/low signal status of individual RS-232C interface leads for a selected site can be displayed until manually terminated without interfering with main channel communications. Transmit and receive signal levels at any port can be measured and displayed in dBm. An audio monitor test uses an audible tone monitored at the operator console to diagnose faults.

Remedial recovery procedures immediately restore communications interrupted by a streaming terminal, line outage, or modem failure. The console operator can restore communications by disabling a streaming terminal monopolizing a multidrop line, switch to a hot spare modem at a remote site to recover from modem failure, switch a remote site modem from a dedicated line to dial backup to recover from a line outage, or switch from dial backup to dedicated facilities once the outage is corrected.

The 90/10 subsystem adds a management reporting facility to the basic EMS-ONE network control system. The 90/10 is an add-on hardware/software turnkey system that produces network status, administrative, and maintenance reports from network statistics gathered by, and retrieved from, the attached EMS-One/Series 90 system. Individual reports are menu selected, and a help utility explains all aspects of the use of the facility. Security measures prevent unauthorized alteration of the database.

System files provide information on current network status, historic events, quantitative test results, and detailed site descriptions.

Historic events are fault records obtained from the EMS-One/Series 90 when operating in the Automatic Monitor (AM) mode. Final records can be sorted by site address, logical site name, fault type, or by chronological order. Fault records can also be sorted on a nested basis by site address, chronological order, and then

 ©1984 Data Decisions

Infinet EMS-One & Series 90
Network Control, Management Reporting & Performance Measurement System

by failure type. Chronological sorts can list events on an overlapping or non-overlapping time basis.

The 90/15 subsystem adds performance monitoring and measurement to an EMS-One equipped with the 90/10 subsystem. The 90/15 is an add-on hardware/software turnkey system that produces network performance statistics and alerts supervisory personnel to catastrophic conditions immediately as they occur. Line utilization, traffic volume, error counts, and response times are reported on demand via color (or monochrome) display console or printer. Thresholds can be established by the user for response times. The reported statistics are produced from information gathered from main-channel network activity through bridging. Line Monitoring Units (LMUs) bridge the main channels at the central-site host FEP or communication controller without interfering with normal network activity.

EMS-ONE Network Control Module • central-site system includes rackmounted processors and modems, 1 to 4 operator consoles and 1 to 4 printers • Control Processor; 1 to 20 Satellite Processors • Interface Processor per Infinet modem; Wrap Option per non-Infinet modem • system supports 80 to 1,520 4-wire dedicated Type 3002 lines; 40 drops per line maximum; 60,800 drops maximum • remote-site equipment includes Test Module per Infinet modem; Wrap Option per non-Infinet modem.

90/10 Module • central-site system includes rackmounted DEC 11/24 CPU with maximum 1024K-byte memory, 120M-byte maximum disk storage, 60M-byte streaming tape drive, 4 printers maximum, 8 operator consoles maximum • requires Series 90 Network Control module.

90/15 Module • central-site system includes rackmounted Line Monitoring Units (LMUs) based on 8088 and Z80A microprocessor; 1M-byte RAM; 4 lines/ports per LMU; 32 lines maximum (8 LMUs) • requires 90/10 module.

☐ EMS-One/Series 90 System Configuration

EMS-One/Series 90 Central-Site Control

System consists of a Control Processor and its complement of up to 20 Satellite Processors, 1 to 4 operator consoles, and 1 to 4 system printers • 1 master console • supports remote consoles and printers via communications facility • supports optional 90/10 Network Management System • 8 ports per Satellite Processor; 1 port per central-site modem • Satellite Processor port links modem through Interface Processor (IP) module at Infinet modem or Wrap Option at non-Infinet modem • IP and Wrap Option monitors modem and line parameters, executes diagnostic testing, and supports control functions via secondary channel on communications link.

EMS-One/Series 90 Kernel System (ACC800) • includes CP750 Control Processor and 1 or 2 EMP-1 Equipment Racks, ACO800 Operator Console, and ARP800 Printer • CP750 Control Processor contains 3K-byte RAM memory and supports up to 20 SP750 Satellite Processors:

$568/$508 mo	$13,600 prch	$165 maint

SP750 Satellite Processor • polls modems for status information; sends commands to selected modems; about 3 seconds per poll/response • polls all ports simultaneously; polls all modems (drops) on same port sequentially • 2K-byte RAM; provides 8 ports; supports up to 320 addressable modems • each port supports an IP750 or IP751 Interface Processor within an Infinet central-site modem, or a non-Infinet modem via an external RAP1000 Wrap Option • requires ACC800 kernel system • 20 SP750 units maximum:

36/30	980	8

IP750 Interface Processor • integral diagnostic/control module executes diagnostic, monitoring, and control functions for single Infinet 1200-, 2400-, or 4800-bps central site modem • supports Infinet NCM or MCS 1200, 2400, or 4800 modems • requires port on SP750 Satellite Processor:

29/24	750	6

IP751 Interface Processor • integral diagnostic/control module executes diagnostic; monitoring; and control functions for single Infinet MCS9600 9600-bps central-site modem • requires port on SP750 Satellite Processor:

26/21	750	6

RAP1000 Wrap Option • standalone diagnostic/control unit for non-Infinet modems; executes diagnostic, monitoring, and control functions • 1 required per modem • requires port on SP750 Satellite Processor:

22/18	695	4

EMP-1 Equipment Rack • accommodates CP750 Control Processor and up to 9 SP750 Satellite Processors • contains dual power supplies and cooling fans • mounts in EC16 Equipment Cabinet; 2 maximum per Series 90 system • included in price of kernel system:

NC/NC	NC	NC

SR2 Equipment Rack • central-site equipment rack for Infinet rackmount modem and modem options; provides 12 slots; slot per modem • contains dual power supplies and cooling fans • mounts in Infinet EC16 Equipment Cabinet:

54/44	1,550	9

EC16 Equipment Cabinet • full-size cabinet accommodates any combination of up to 5 SR2 and EMP-1 Equipment Racks or other standard 19-inch rackmountable equipment:

63/51	1,975	NC

ACO800 Operator Console • contains CRT display screen and functional keyboard • console screen divided into 6 functional areas • prompt area displays operator prompting • System Faults area displays current number of total system failures • Data area displays available selectable control options or test results of specific diagnostic tests • Instruction area displays diagnostic commands under execution and port/line/drop address where test is being conducted • Status area displays current operating status • Time area displays current time of day (hour/minute) on system real-time clock • console keyboard color-coded to distinguish between communications interfering and non-interfering functions; system activity file and diagnostic test functions interfere with normal communications • monitor, remedial recovery, and operational functions do not interfere with normal operation • 3-position keyswitch lock disables console (power-off), disables communication interfering functions, or enables all functions • initial console included in kernel system price; up to 4 consoles per EMS-One/Series 90 system:

250/225	4,700	45

APR800 Printer • 180-cps printer • initial printer included in kernel system price • up to 4 printers per EMS-One/Series 90 system:

200/180	2,650	55

EMS-One/Series 90 Remedial Recovery

Provides immediate recovery from line or modem failures, or from terminal streaming condition through automatic dial backup, hot spare modem switching, and streaming terminal disable • dial backup switches modems at attended (central) site and unattended (remote) site between 4-wire dedicated line and 2 dial-up lines to restore communications interrupted by line failure/degradation • hot spare modem switching switches data terminal equipment and 4-wire dedicated line between faulty modem and hot spare modem to restore communications interrupted by modem failure/degradation • streaming terminal disable disconnects a disruptive terminal that monopolizes a multipoint line through prolonged or continuous Request-To-Send (RTS) signal; RTS sustains modem carrier signal preventing use of line by other multidropped terminals.

LMB409 Line Monitored Bridge • central-site dial backup for up to 9 drops on a multipoint line • bridges 9 dial backup line

MO: single-unit monthly 2-year/3-year lease charge; does not include maintenance. PRCH: single-unit purchase price. MAINT: monthly maintenance charge for leased or purchased units. NC: no-cost item. Prices effective as of June 1984.

 ©1984 Data Decisions

Infinet EMS-One & Series 90

Network Control, Management Reporting & Performance Measurement System

pairs onto single 4-wire line to central-site modem • monitors and displays analog transmit and receive levels • requires 2 IN1000A CDT manual Data Access Arrangement for each 2 DDD line pairs • requires DA300 or DA368 Dial Backup Unit at each remote site:

$38/$25 mo	$1,035 prch	$5 maint

IN1000A CDT Manual Data Access Arrangement • connects LMB409 Line Monitor to DDD network; 1 required per DDD line:

4/4	100	1

DA300 Dial Backup Unit • remote-site dial backup unit connects DDD network to remote-site modem • unattended operation • requires IN1001F CBS Auto-Answer Data Access Arrangement • standalone unit for Infinet MCS Series and non-Infinet modems:

11/10	295	2

IN1001F CBS Auto Answer Data Access Arrangement • connects DA300 Dial Backup Unit to DDD network • unattended operation for remote site • 2 required; 1 per DDD line:

5/5	200	1

DA368 Dial Backup Unit • FCC-certified remote-site dial backup unit connects DDD network to remote-site modem • unattended operation • automatic answer • PC board installs in Infinet NCM Series modems:

16/11	395	3

HSP200 Hot Spare Modem Switch • switches digital and analog lines between primary and secondary hot spare modems at remote site • standalone unit for Infinet MCS Series or non-Infinet modems:

10/7	310	3

SPS2000 Spare Modem Switch • switches digital and analog lines between primary and integral secondary spare modem at remote site • standalone unit for Infinet NCM Series modems only:

10/9	325	3

EMS-One/Series 90 Remote-Site Control

Modem Control

Network control functions at intermediate (hub) and remote sites implemented for Infinet MCS and the newer NCM Series modems by a Test Module, and for non-Infinet modems by a Wrap Option • secondary channel supports network control functions • Test Module contained on printed circuit board resides in standalone modem cabinet • Wrap Option contained in standalone unit and interfaced with modem.

CL750 Test Module • hub site diagnostic/control module • supports 1200/2400/4800-bps Infinet MCS or NCM Series modems • 1 required per modem:

$29/$20 mo	$730 prch	$5 maint

CL751 Test Module • hub or remote-site diagnostic/control module • supports 9600-bps Infinet MCS or NCM Series modems • 1 required per modem:

29/20	730	5

MP760 Test Module • remote-site diagnostic/control module • supports 1200/2400/4800-bps Infinet MCS or NCM Series modems • 1 required per modem:

25/17	635	4

TSD500 Test Sharing Device • hub site diagnostic/control module routes secondary channel around digital equipment such as nodal processors, concentrators, multiplexer, etc • interfaces with CL750/CL751 Test Modules • duplicates diagnostic channel for up to 4 tail circuits • cascaded units support up to 15 tail circuits:

13/10	365	2

RAP1000 Wrap Option • diagnostic/control unit for non-Infinet modems • required per central- and remote-site modem:

22/18	695	4

CM100 Switch • single channel A/B transfer switch for reconfiguration or backup device switching • EIA RS-232C 25-pin cable connectors • local/remote control • up to 9 CM100 switches per RCS900 rackmount enclosure • local/remote control of gang switching:

11/10	315	2

RCS900 Enclosure • rackmount enclosure for maximum of 9 CM100 Switches:

27/24	785	4

☐ 90/10 Network Management System Configuration

The 90/10 subsystem option consists of a DEC PDP-11/24 CPU with 348K, 512K, or 1024K bytes of memory, 1 or 2 60M-byte Winchester disk drives, a 60M-byte streaming cartridge tape drive, 1 to 4 180-cps matrix printers, 1 to 8 color CRT operator consoles, an EC16 Equipment Cabinet, and an 8-channel multiplexer and dial-up modem • 1 standard model configuration • other configurations available.

NMS9000 (90/10) • includes DEC PDP-11/24 CPU with 384K bytes of memory (expandable to 512K bytes), a 60M-byte Winchester disk drive, a 60M-byte streaming cartridge tape drive, an ID100 color CRT operator console (expandable to 4), a 180-cps matrix printer (expandable to 4), EC16 Equipment Cabinet, and an 8-channel multiplexer and dial-up modem (Vadic 3455) for field service support • also includes kernel EMS-One system consisting of CP750 control processor with EMP-1 Equipment Rack for SP750 Satellite Processors, an ACO800 Operator Console, APR800 Printer, and EC16 Equipment Cabinet • does not include SP750 Satellite Processors or IP750/IP751 Interface Processors:

$3,500/$2,875 mo	$89,500 prch	$725 maint

NMS9050 Series 90 Upgrade • same as NMS9000 (90/10) configuration without Series 90 kernel system:

3,100/2,575	79,500	575

NMS9150 Pax & 256K-Byte Memory • physical address extension with additional 256K-byte increment; required for memory expansion above 256K bytes • 1 maximum per system:

315/255	7,950	40

NMS9151 Memory • 256K-byte additional memory; NMS9150 required for first additional 256K-byte increment • 1024K-byte maximum memory capacity:

180/145	4,500	25

NMS9101 Operator Console • ID100 color CRT console • 4 or 8 maximum per 9010-1 or 9010-2 model configurations, respectively:

295/240	7,500	40

NMS9102 Operator Console • VT-100 B/W CRT console • 4 or 8 maximum per 9010-1 or 9010-2 model configurations, respectively:

148/140	3,750	30

NMS9103 Printer • Dataproducts M-120 180-cps matrix printer:

165/135	4,200	55

NMS9104 Disk Drive • 60M-byte Winchester disk drive:

285/230	7,200	60

☐ 90/15 Network Performance System Configuration

NMS9015 (90/15) • 16-line network control/management/performance measurement system • includes ACC800 (Series 90 kernel system), DEC PDP-11/24 CPU with 1M bytes of memory; one or two 60M-byte Winchester disk drives, a 60M-byte streaming cartridge tape drive, an ID100 color CRT operator console (expandable to 4), a 180-cps matrix printer (expandable to 4), EC16 Equipment Cabinet, and an SR2-PM Line Monitor Unit enclosure (card cage with 8 slots) with 4 Line Monitor Units (LMUs) • IBM SDLC or BSC protocols • also includes all 90/10 and 90/15 software • does not include SP750 Satellite Processors or IP750/IP751 Interface Processors • expandable to 32 lines by adding LMU-004 • prepaid annual maintenance fee:

$8,400/$4,400 mo	$135,000 prch	$14,550 maint

NMS9015 (90/15) PMS-16-MU • 16-line performance measurement system; upgrade kit; requires EMS-One/90/10

©1984 Data Decisions

Infinet EMS-One & Series 90

Network Control, Management Reporting & Performance Measurement System

subsystem • expandable to 32 lines by adding LMU-004 • prepaid annual maintenance fee:

2,100/1,715	**53,000**	**5,800**

SR2-PM Equipment Rack • central-site equipment cabinet contains rackmounted card cages for additional Intertel LMUs • supports up to 8 LMU-004s • prepaid annual maintenance fee:

160/130	**4,000**	**100**

LMU-004 • 4-port Line Monitor Unit (LMU) card for add-on to existing installation • NMS9015 and PMS-16-MU support up to 4 additional LMU-004s, 32 lines maximum • fits in slot of rackmounted card cage • prepaid annual maintenance fee:

240/195	**6,000**	**400**

• END

©1984 Data Decisions

Infinet Diagnostic Modem Extended (DMX) Family
Models DMX1200, DMX2400, DMX4800, DMX9600 & DMX14400

■ PROFILE

Function • high-performance modems with network control capabilities for dedicated facilities.

Communications/Networks • asynchronous/synchronous at 1200 bps and synchronous at 2400/4800/9600/14.4K bps, point-to-point, multipoint, and multichannel communications over unconditioned 4-wire dedicated Type 3002 facilities • D1 conditioning required for 14.4K bps operation • DMX1200 compatible with AT&T 202 modems; DMX2400 compatible with AT&T 201 modems; compatible with Infinet NCM modems in a nonnetwork control environment • designed for use with Infinet's MES-II network control module, PMS-II performance measurement module, and NIS 90/60 network information system.

First Delivery • February 1985.

Units Delivered • undisclosed.

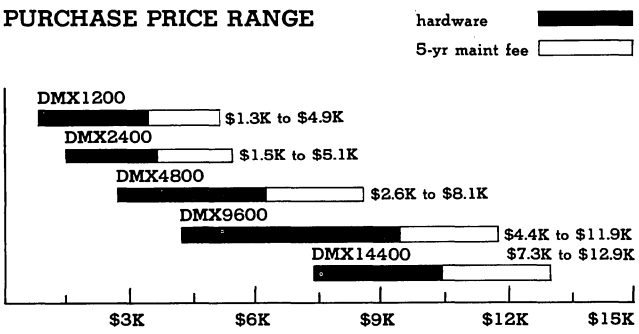
Comparable Systems • principal competition from AT&T Dataphone II Series; Codex 2600 Series; NCR Comten 7160 Series; Paradyne VHS/MPX Series; Racal-Milgo Omnimode Series.

Vendor • Infinet Inc; Six Shattuck Road, Andover, MA 01810 • 617-681-0600.

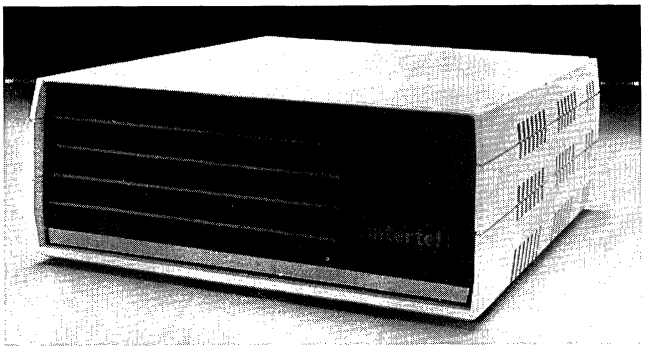
Canadian Headquarters • none.

Distribution • nationwide via local Infinet direct sales offices • Great Britain via Infinet LTD and distributor • Puerto Rico via Infinet MFG Del Caribe and distributor • distribution channels in Belgium, Bolivia, Columbia, Greece, India, Israel, Italy, Korea, Luxembourg, Netherlands, Sweden, Switzerland, Taiwan, Thailand, and Venezuela.

PURCHASE PRICE RANGE



INFINET DMX SERIES PURCHASE PRICING bar graphs cover price ranges between "small" and "large" configurations for hardware (solid bars), and for associated 5-year period maintenance fees (open bars) • **DMX1200 small** configuration consists of DMX1200R rackmount model; **large** of FTM1200 with integral spare modem, dial backup, and secondary channel options • **DMX2400 small** configuration consists of DMX2400R rackmount model; **large** of FTM2400 with integral spare modem, dial backup, and secondary channel options • **DMX4800 small** configuration consists of DMX4800R rackmount model; **large** of FTM4800 with integral spare modem, dial backup, secondary channel, and 4-channel mux options • **DMX9600 small** configuration consists of DMX9600R rackmount model; **large** of FTM9600 with integral spare modem, dial backup, and 4-channel mux options • **DMX14400 small** configuration consists of DMX14400R rackmount model; **large** of DMX14400 with dial backup and 6-channel mux options.



GSA Schedule • listed.

■ ANALYSIS

The aging NCM Series has been replaced by a new product line designed to operate with Infinet's revamped network control and management systems. The Diagnostic Modem Extended (DMX) family comprises Models 1200, 2400, 4800, 9600, and 14400 that are fully compatible with Infinet's enhanced EMS-II network control system and NIS 90/60 performance measurement and management reporting system. Based on the original NCM modems, the DMX series are microprocessor-based units containing a new Universal Diagnostic Card (UDC840) that implements network control functions. The UDC840 Card comes standard with all DMX modems and resides in the modem enclosure to provide remote modem control and network diagnostics from a central site.

The standard UDC840 Card combines functions previously available for NCM modems with the purchase of 3 optional test modules. Central, hub, and remote-site diagnostic monitoring and control functions are now executed by a single UDC Card, eliminating the need to purchase additional cards. In addition to standard test features, the UDC840 Card measures line operating parameters by using an internally generated 1004-Hz tone for measuring line-level, phase jitter, and single-to-noise ratio. This beneficial feature, often found lacking in competitive systems aids the user in diagnosing telephone line degradation. A new Trace feature is also supported by the UDC Card for examining the modem's EIA interface. Serving as a multitrace oscilloscope, this test capability generates the simultaneous inspection of 78 leads.

DMX modems are primarily designed to operate with EMS-II and NIS 90/60. In a network control environment, the modems automatically alert users of deteriorating line conditions so that remedial action can be taken short of line failure. The user can quickly pinpoint failures through modem-executed diagnostics that isolate failures within central- or remote-site modems, or the line. The diagnostics are automatically executed in response to operator commands at the central-site 90/60 console. Options are available for remedial recovery from modem or line failures through modem substitution or dial backup. Fallback data rates support the possible resumption of communications with tolerable error rates over degraded facilities.

Without network control, user awareness of degradation or failure, and diagnostic testing is severely limited. The user is alerted to degradation through visual observance of front-panel indicator

 ©1985 Data Decisions

Infinet Diagnostic Modem Extended (DMX) Family
Models DMX1200, DMX2400, DMX4800, DMX9600 & DMX14400

lamps, which indicate good, marginal, or poor signal quality. Diagnostic tests conducted through front-panel controls establish analog and digital loopback paths, and generate a pseudo-random bit pattern with or without injected bit errors to test operating integrity and isolate failures.

☐ Strengths

The Infinet DMX Series modems offer several important user benefits. Chief among these are the advantages of network control to eliminate excessive downtime. It puts the network manager in touch with network performance, and provides the means to quickly isolate failures, removing the guesswork from failure isolation. It also provides immediate remedial recovery from line or modem failures through dial backup or spare modem switching until a failure is resolved. Dial backup and spare modem switching with central-site control can be implemented without network control; however, these remedial functions are far easier to execute from a network control operator console.

Users with critical applications will be attracted to the DMX fault-tolerant models. Like the older NCM modems, this internal spare modem is activated by a central-site command and provides instantaneous communication restoral. It resides in the modem cabinet and shares the same power supply of a remote standalone modem. Not only does this option offer cost and space savings, it precludes the need for a hot spare with additional cabling, additional space requirements, and second power source. The incorporation of the standard UDC840 Card into the DMX line provides the DMX user with several advantages over the older test methods employed by NCM modems. Foremost, the DMS UDC840 Card comes standard on all DMX models; the purchase of 3 optional test modules was previously required in order to equip NCM modems with the same test features. Additionally, the UDC840 Card allows the user to monitor telephone line quality for speeding up problem diagnosis, and supports the measurement of EIA interfaces; both previously unavailable for NCM modems. Although DMX and NCM modems are restricted from transmitting diagnostic information in a network configuration, the NCM user can upgrade to full DMX capacity by purchasing a UDC840 on a board-swap basis for $875.

Fast training time is an important consideration for multidrop networks. Infinet DMX4800 and DMX9600 modems train in 25 milliseconds (RTS/CTS delay) in a carrier-controlled environment; though not the fastest in the industry, it significantly reduces the time lost to training time delays, which can be appreciable where there are many drops per line. This is a valuable asset where volume traffic conditions exist.

The auxiliary Secondary Channel option eliminates the cost of a second line and modems to satisfy the need to transmit data at telegraph rates up to 150 bps. It also provides a means for controlling remote-site user applications such as lighting, heating/air conditioning, and security measures from a central site.

The Multiport option for the DMS4800, 9600, and 14400 eliminates the cost of extra lines and modems for users with additional terminals at a remote site. The option multiplexes as many as 4 low-speed data streams on a 4800-/9600-bps line, and as many as 6 on a 14.4K-bps line, resulting in considerable cost savings.

☐ Limitations

The new DMX Series is **only** compatible with Infinet's extended EMS-II and NIS 90/60 system; these modems **will not** work with the older EMS-One and Series 90 Systems. Furthermore, DMX modems cannot share diagnostic information with existing NCM modems configured in a network. This compatibility issue presents a drawback to current NCM and EMS-One users who are forced to upgrade their units at extra cost. An EMS-II upgrade is available; however, the NIS 90/60 system is still undergoing beta testing and is not yet ready for delivery. This creates a problem for existing DMX users who **must wait** for NIS 90/60 availability in order to effectively utilize their equipment for performance measurement and management reporting applications. Furthermore, users wishing to upgrade their older Series 90 systems **must wait** until an upgrade package is made available. Users with specific applications requiring an auxiliary channel to function as a low-seed TTY channel or for building management control should consider the absence of a secondary channel option on high-end DMX9600 and DMX14400 models.

While Infinet does support multiport options for DMX models 4800, 9600, and 1440, it does not include any provision for asynchronous-to-synchronous data conversion. Competitive offerings from vendors such as Codex and Paradyne include async/sync converters in their product line-ups which enable asynchronous terminals to transmit data at top rated speeds (up to 9600 bps). Asynchronous to synchronous data conversion converts asynchronous data at the digital EIA interface to a synchronous data stream (and the converse).

Infinet's maintenance is sometimes performed through third parties. Third-party maintenance is not the same as direct vendor support, where the vendor is totally in control and might be more responsive to customer needs. Infinet claims, however, that 80 percent of service calls are handled by its own personnel.

■ HARDWARE

☐ Terms & Support

Terms • available for purchase or for lease under 2-, 3-, 4-, or 5-year agreement; maintenance not included in lease price, but required for leased equipment • lease/purchase credit is 40 percent of lease paid out up to 70 percent of purchase price • 1-year warranty for purchased units • quantity discounts available for purchased or leased units.

Support • installed by user or by Infinet; minimum per-site charge varies with configuration and distance from service center • 4 service plans available; maintenance performed under maintenance agreement, on per-call basis, customized contract, or factory service • contract and on-call maintenance performed during normal business hours of 8:30 AM to 5:00 PM, Monday through Friday except for holidays; maintenance during hours outside prime shift available for contract maintenance only, and only in certain areas • per-call maintenance billed for time, materials, and travel expenses • factory service available for purchased equipment only; service billed for repair or replacement; repair or replacement at no cost for equipment under warranty; turnaround within 30 days • nationwide service through Infinet and third-party service representative including Dow Jones and Western Union at over 300 service centers in 49 states, Puerto Rico, and 3 locations in Canada • service response time quoted at 4 hours within 50 miles of service center; 6 hours between 51 and 100 miles of service center; and 8 hours at 100 to 150 miles • telephone consultation available through Infinet Customer Service Technical Support Group, Andover, MA • 200 Infinet parts supply locations replenished on an overnight basis from Federal Express Partsbank, Memphis, TN.

☐ Overview

The 5 models of the Infinet Diagnostic Modem Extended (DMX) Family are designed for point-to-point and multipoint network configurations, and for use in a network control environment. The modems are fully compatible as components within Infinet's EMS-II, PMS-II, and NIX 90/60 network control, performance measurement, and management reporting systems. All DMX modems contain microprocessor-controlled logic to execute commands entered at a central-site control system operator console. Network control commands and functions are transmitted between the central-site network control system and individual modems via a full-duplex narrowband secondary channel supported by each modem. Network control functions include monitoring of both analog and digital interfaces for abnormal conditions that exceed alarm thresholds, diagnostic testing procedures, and remedial recovery from failures. The modems also provide manual control for diagnostic functions that include local analog and digital loopback, and bit error rate testing via a pseudo random bit pattern produced by an internal generator.

The modems are available in different configurations defined by model number. The different configurations include basic unit, rackmount unit, and fault-tolerant unit. All 3 versions include a standard UDC840 diagnostic card. Options include network

 ©1985 Data Decisions

Infinet Diagnostic Modem Extended (DMX) Family
Models DMX1200, DMX2400, DMX4800, DMX9600 & DMX14400

control compatibility for the Infinet EMS-II and NIS 90/60 network control performance measurement, and management reporting systems; secondary channels feature for DMX1200, DMX2400, and DMX4800 models; spare modem and switch, dial backup, and multiport communications which supports up to 4/6 synchronous channels for DMX4800, DMX9600, and DMX14400.

DMX1200/DMX1200R/FTM1200 Configuration • standalone or rackmount unit supports standard network control and optional secondary channel and dial backup • Model FTM1200 supports the same features but includes an integral spare modem and switch.

DMX1200/DMX1200R/FTM1200 Configuration • standalone or rackmount unit supports standard network control and optional secondary channel and dial backup • Model FTM1200 supports the same features but includes an integral spare modem and switch.

DMX2400/DMX2400R/FTM2400 Configuration • standalone or rackmount unit supports standard network control and optional secondary channel and dial backup • Model FTM2400 supports the same features but includes an integral spare modem and switch.

DMX4800/DMX4800R/FTM4800 Configuration • standalone or rackmount unit supports standard network control and optional secondary channel, dial backup, and 4-channel multiplexer • Model FTM4800 supports the same features but includes an integral spare modem and switch.

DMX9600/DMX9600R/FTM9600 Configuration • standalone or rackmount unit supports standard network control and optional secondary channel (mutually exclusive with network control), dial backup, and 4-channel multiplexer • Model FTM9600 supports the same features but includes an integral spare modem and switch.

DMX14400/DMX14400R Configuration • standalone or rackmount unit supports standard network control and optional secondary channel (mutually exclusive with network control), dial backup, and 6-channel multiplexer.

☐ Packaged Modems

Standalone packaging, or rackmount packaging at reduced cost • rackmount models do not contain power supply; rackmount power derived from SR2 Equipment Rack dual power supply; 2 to 12 modems per SR22 cabinet depending on modem model and applications • Fault Tolerant Models (FTM) provide an enlarged cabinet with integral spare modem for remote-site applications.

DMX1200 • standalone 1200-bps unit with UDC840S Test Card for network control:

$48 mo	$1,460 prch	$17 maint

DMX1200R • rackmount 1200-bps unit with UDC840R Test Card for network control:

43	1,325	17

FTM1200 • standalone 1200-bps unit with UDC840S Test Card for network control, spare modem, and transfer switch:

85	2,570	17

DMX2400 • standalone 2400-bps unit with UDC840 Test Card for network control:

56	1,695	17

DMX2400R • rackmount 2400-bps unit with UDC840R Test Card for network control:

50	1,540	17

FTM2400 • standalone 2400-bps unit with UDC840S Test Card, spare modem, and transfer switch:

93	2,810	15

DMX4800 • standalone 4800-bps unit with UDC840S Text Card for network control:

90	2,750	26

DMX4800R • rackmount 4800-bps unit with UDC840R Test Card for network control:

85	2,600	26

FTM4800 • standalone 4800-bps unit with UDC840S Test Card for network control, spare modem, and transfer switch:

147	4,450	20

DMX9600 • standalone 9600-bps unit with UDC840S Test Card for network control:

154	4,675	30

DMX9600R • rackmount 9600-bps unit with UDC840R Test Card for network control:

143	4,350	28

FTM9600 • rackmount 9600-bps unit with UDC840S Test Card for network control, spare modem, and transfer switch:

236	7,150	25

DMX14400 • standalone 14.4K-bps unit with UDC840S Test Card for network control:

262	7,950	40

DMX14400R • rackmount 14.4K-bps unit with UDC840R Test Card for network control:

242	7,350	37

☐ Application

Point-to-point or multipoint communication over unconditioned 4-wire dedicated Type 3002 voice channel (excluding DMX14400) • strappable RTS/CTS delay; 25 or 50 milliseconds for DMX4800 with switched carrier, 0- or 10-millisecond delay with constant carrier; 25 or 253 milliseconds for DMX9600 with switched carrier, 0- or 15-millisecond delay with constant carrier • DMX4800/9600/14400 supports multiport communication over point-to-point line • DMX14400 supports point-to-point communication over a 4-wire dedicated Type 3002 voice channel with D-1 conditioning.

☐ Operating Parameters

DMX1200 • full-duplex; strap selectable asynchronous/synchronous at 1200/1800 bps • FSK modulation • strap-selectable RTS/CTS delay at 0/8/30/60/225 milliseconds • CCITT V.23 compatibility • statistical equalization.

DMX2400 • half-/full-duplex synchronous at 2400-/1200-bps fallback • DPSK modulation; 4 phase at 2400 bps; 2 phase at 1200 bps • strap-selectable RTS/CTS delay at 0/9.5/26.5/72.5 milliseconds • CCITT V.26 compatibility • statistical equalization.

DMX4800 • half-/full-duplex synchronous at 4800 bps • QAM modulation at 4800 bps • RTS/CTS delay strap selectable at 0/10 milliseconds for constant carrier; 25/50 milliseconds (training time) for switched carrier • optional V.27 bis compatibility • automatic adaptive equalization.

DMX9600 • half-/full-duplex synchronous at 9600/7200/4800-bps fallback • QAM modulation • RTS/CTS delay strap selectable at 0/15 milliseconds for constant carrier; 25/253 milliseconds for switched carrier • CCITT V.29 compatibility • automatic adaptive equalization.

DMX14400 • half-/full-duplex synchronous at 14.4K/12K/9600-bps fallback • QAM modulation • RTS/CTS delay strap selectable at 0/10 milliseconds for constant carrier; 255/450 milliseconds for switched carrier • automatic adaptive equalization.

☐ Channel Functions

DMX4800 Multiport • DMX4800 accommodates optional MX400 integral 4-channel TDM (bandsplitter) multiplexer • selectable data rate combinations of 1200- and 2400-bps with an aggregate rate of 4800-bps • cannot be used with internal modem option:

$28 mo	$850 prch	$4 maint

MO: 3-year monthly lease charge; does not include maintenance. PRCH: single-unit purchase price. MAINT: monthly maintenance charge for leased or purchased units. NC: no-cost item. NA: not available/applicable. Prices current as of March 1985.

©1985 Data Decisions

Infinet Diagnostic Modem Extended (DMX) Family
Models DMX1200, DMX2400, DMX4800, DMX9600 & DMX14400

DMX9600/DMX14400 Multiport • DMX9600/DMX14400 accommodate optional IMX600 integral 4-/6-channel TDM (bandsplitter) multiplexer • selectable data rate combinations from 14.4K bps to 2400 bps for an aggregate rate of 14.4K/9600 bps • cannot be used with internal spare modem or hot spare modem option • operating parameters and channel configurations can be controlled from a central-site EMS-II and a UDC840 Card:

40	1,200	12

Universal Diagnostic Card (UDC840) • equips modem with network control functions when used in network with Infinet EMS-II and NIS 90/60 systems • provides central-, hub-, and remote-site diagnostic, monitoring, and control functions • internally-generated 1004 Hz tone measures operating line parameters • Trace feature monitors modem EIA interface by measuring 7 leads simltaneously • PC board module first in modem enclosure and is a standard feature with all DMX models:

NC	NC	NC

Secondary Channel • FSK, 150-bps, asynchronous auxiliary full-duplex channel FDM multiplexed with main high-speed channel for user-specified applications • available for all DMX models 1200, 2400, and 4800:

17	495	3

Digital Interface • EIA RS-232C/CCITT V.24/V.28 on all ports • 25-pin electrical connector.

☐ Control Functions

Failure Recovery • provides immediate recovery from line or modem failures • switches modems at attended and unattended sites between 4-wire dedicated line and 2 dial-up lines to restore communications interrupted by line failure/degradation • switches data terminal equipment between faulty modem and hot spare modem to restore communications interrupted by modem failure/degradation.

LMB409 Line Monitor Bridge • central-site dial backup for up to 8 drops as a multipoint line • bridges 8 pairs of dial lines onto single line to central-site modem • monitors analog transmit and receive levels and displays results via LEDs • requires IN1000A CDT manual Data Access Arrangement for each dial line • requires DA368 Dial Backup Unit at each remote modem:

$34 mo	$1,035 prch	$5 maint

IN1000A CDT Manual Data Access Arrangement • connects LMB409 Line Monitor Bridge to dial network • 1 required per dial line:

6	175	1

DA368 Dial Backup Unit • FCC-certified remote-site dual-dial backup unit connects pair of dial lines to remote-site modem • automatic answer; unattended operation • does not require Data Access Arrangement:

17	510	3

Hot-Spare Modem • PC board for installation within standalone DMX14400R modem or in SR22 equipment rack at central site • cannot be used with Multiport feature • see DMX14400R for pricing; no maintenance charge.

HSP200 Spare Modem Switch • switches digital and analog lines between primary and standalone secondary spare modem:

15	475	3

☐ Diagnostic & Status Indicators

Comprehensive diagnostics isolate failures in local or remote modems or dedicated line • manual or automatic control through network control systems of diagnostic functions • visual indication of operating conditions; visual warning of deteriorating or abnormal conditions.

Loopback Tests • local analog loopback in accordance with CCITT V.54 Loop 3; local digital loopback in accordance with CCITT V.54 Loop 2:

NC mo	NC prch	NC maint

Test Pattern Generation • integral pseudo random generator/comparator for bit error rate testing; can be used with loopback:

NC	NC	NC

Status Indicators • indicates operating mode; test mode; signal quality; and EIA interface signal activity • signal quality indicates bit error rate of better than 1 bit error for every 1 million bits transmitted:

NC	NC	NC

• **END**

©**1985 Data Decisions**

Infotron Statistical Multiplexers, Network Concentrators & Processors

Supermux 380, 480, 600 Series & 680; 790/792NC & 990/992NP

■ PROFILE

Function • statistical multiplexers, network concentrators, and network processors.

Communications/Networks • models 380/480/600/680/790/792/990/992 support up to 8/8/32/32/128/640/56 asynchronous or synchronous, half- or full-duplex channels at rates up to 9600 bps; up to 14.4K bps with bandsplitter option • maximum aggregate channel rate (per composite link) of 76.8K bps, Supermux 380/480; 307.2K bps, Supermux 600; 38.4K bps, Supermux 680, and 790/792NC and 990/992NP (higher aggregate rates for wideband links) • Supermux 380/480/680 supports a single composite link; Supermux 600 Series supports up to 2 composite links; 790/792NC and 990/992NP support up to 15 composite links • modified SDLC/CCITT X.25 Level 2 link protocol.

First Delivery • 1978 for Supermux 480; 1980 for Supermux 680 and 790 Network Concentrator; 1982 for Supermux 380/600; 1983 for 792 Network Concentrator; 1984 for 990/992 Network Processors.

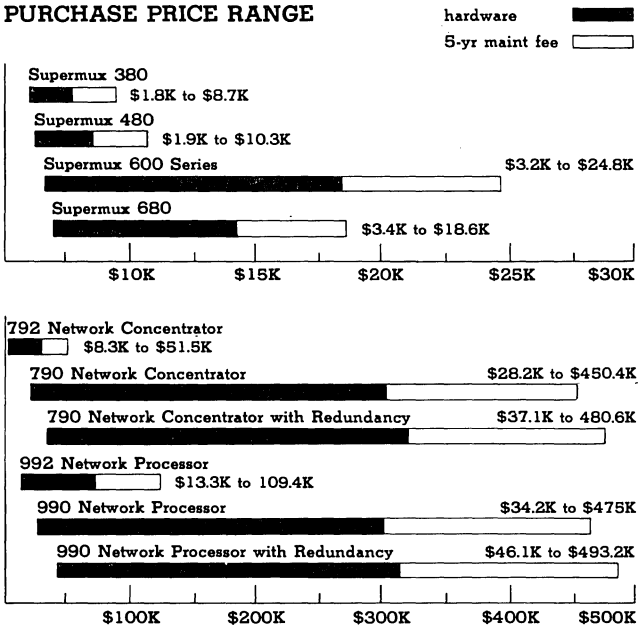
Systems Delivered • over 13,000 systems delivered, all Supermux models; 2,700 systems delivered, 790/792 Network Concentrators.

Comparable Systems • principle competition for Infotron Supermux models from Codex 6000 Series; DCA System 100; Micom Micro800/2; Racal-Milgo Omnimux; CASE Rixon DCX Series; Timeplex Microplexer, Enhanced Switching Microplexer, Quad Switching Microplexer, and Networking Microplexer • for Infotron 790/792NC and 990/992NP from CASE Rixon DCX840/DCX850; DCA System 355; Codex 6050; Timeplex Networking Microplexer.

Vendor • Infotron Systems Corporation; 9 North Olney Avenue, Cherry Hill Industrial Center, Cherry Hill, NJ 08003 • 609-424-9400; toll-free 800-257-8352.

Distribution • nationwide via Infotron direct sales offices for all models; local distributor network for Supermux 380, 480, 600,

PURCHASE PRICE RANGE



INFOTRON MULTIPLEXERS/CONCENTRATORS PURCHASE PRICING bar graphs cover price ranges between "small" and "large" configurations (solid bars), and for associated 5-year period maintenance (open bars); note that 75 percent/25 percent/async/sync channel ratio was employed in configurations when applicable • **Supermux 380 small** configuration consists of 4-channel mux; **large** of 8-channel mux with integral 9600-bps bandsplitting modem • **Supermux 480 small** configuration consists of 4-channel mux; **large** of 8-channel mux with integral 9600-bps bandsplitter modem • **Supermux 600 Series small** configuration consists of 4-channel/1-link mux; **large** of 32-channel/2-link mux with Portable Keyboard/Display unit and integral 9600-bps modem • **Supermux 680 small** configuration consists of 4-channel mux; **large** of 32-channel/3-link mux with bandsplitter option • **792 Network Concentrator small** configuration consists of 8-channel/1-link mux; **large** of 72-channel/2-link mux • **790 Network Concentrator small** configuration consists of 56-channel/1-link mux; **large** of 640-channel/7-link mux • **790 Network Concentrator with Redundancy** configuration same as 790 configuration with added system redundancy • **992 Network Processor small** configuration consists of 8-channel/1-link mux; **large** of 104-channel/2-link mux • **990 Network Processor small** configuration consists of 56-channel/1-link mux; **large** of 640-channel/7-link mux • **990 Network Processor with Redundancy** configuration same as 990 configuration with added system redundancy.

 ©**1984 Data Decisions**

Infotron Statistical Multiplexers, Network Concentrators & Processors
Supermux 380, 480, 600 Series & 680; 790/792NC & 990/992NP

and 680 • Canada via Infotron Canada, Limited; Mississauga Executive Center, 2 Robert Speck Parkway, Mississauga, ON L4Z 1H8; 416-275-3888 • Europe via Infotron Systems Limited; Poundbury Road, Dorchester, Dorset DT1 1TQ, England; 0305-66016.

■ ANALYSIS

Over the past year, Infotron has made a considerable effort to improve its product line in respect to overall network strategy. The Supermux 380 Basic and Fully Featured models have been consolidated into 1 380 statistical multiplexer. Another Supermux model, the older 780, has been dropped from the line-up. At the high-end, Infotron has unveiled the 990/992 Series of Network Processors. Targeted at users with complex, large-scale networks, the 990/992NP provides an extended level of networking support.

Many of the 790/792NC standard features have been incorporated into the 990/992NP including some options that had been originally intended for the 790. Among these 790/792 anticipated options are the BSC emulation feature and the ANM-800 real-time network monitoring system. Another option that had been planned for availability on the 790/792NC is an X.25 link module. Although not available at the present time, an X.25 link module for host demuxing on the 990/992NP is currently under development. According to Infotron, the most significant difference between the 790/792NC and 990/992NP systems is the 990 standard Tandem Switching/Alternate Reconfiguration (TSAR) feature. With TSAR, the user need only enter end-point parameters and all intermediate nodes and/or paths are automatically configured. If a link module is overloaded or fails, TSAR dynamically reroutes data around the congested or faulty node to a different link module.

Existing 790/792 users can upgrade their systems to 990/992 functionality by selecting any or all of the 990's additional functions. In addition, compatibility problems that previously existed between the 790/792 network concentrators and Supermux models 380 and 600 have been resolved by the inclusion of new link modules. Another newly released option for the 790 is a 4E4 SDLC Pass-Thru Channel Adapter. Overall, pricing remained constant for most Infotron models except for the 790/792 Network Concentrators, which experienced price increases of approximately 10 percent for most components.

The Supermux line of statistical multiplexers encompasses 4 models that focus on small-to-medium-scale network requirements. The Supermux 380 and 480 are both designed to combine 8 or fewer asynchronous lines or devices on a high-speed link. The 380 can also provide 1 synchronous input via a bandsplitter/9600-bps integral modem option, while the 480 is available with a bandsplitter option to accommodate 1 or 2 synchronous channels multiplexed with the 480's composite link. Both models include a full complement of 4 or 8 nonremovable channels and 1 composite network port. Channels for both the 380 and 480 are field expandable from 4 to 8 channels. Neither model, however, is compatible with the other. The 380 can operate at higher composite link rates (19.2K versus 9600 bps) and can include several standard features such as Automatic Baud Recognition and Channel Diagnostics which are available only as extra-cost options for the Supermux 480. Both the 480 and the 380 can be linked to the 790/792NC and 990/992NP provided that the particular system is equipped with a 480 and 380 link module.

The Supermux 600 Series multiplexers consist of point-to-point and multinode models to accommodate data networks of up to 3 nodes. All units are available in 16- or 32-channel basic card frames, expandable in 4-channel increments of asynchronous and/or byte-synchronous channels. Various models in this series can support node bypass, alternate link routing, and channel-switching arrangements. Node bypass allows 2 single-link remote nodes in a 3-node, dual-link network to communicate by routing data traffic through the dual-link hub multiplexer. Alternate routing is configured in a 3-node, 3-link network in which all 3 nodes are dual-link models, each connected to the other. If one of the links fails, traffic for that link can be routed in a different direction through an intervening node and then on to the destination node. 600 Series multiplexers with integral switching/contention logic can assign individual channels or channel groups to select or contend for other channels, as well as include dedicated channels. Individual 600 switching nodes can also perform as standalone data PBXs, interconnecting compatible terminals without the need for composite link communication. Infotron has added traffic balancing models to the 600 Series that will support point-to-point dual composite links each running at 9600 bps. If one of the links in a traffic balancing configuration fails, the other link will pass traffic for both links until the outage is restored. A new 790/600 link module connects up to 32 9600-bps channels from a remote 600 to 790 over a single, synchronous link at speeds up to 19.2K bps.

The Supermux 680 is designed to satisfy small-to-medium-scale network requirements. It supports a maximum of 32 asynchronous or 16 synchronous channels in dual-channel increments. Synchronous channels maintain priority over asynchronous channels, which means some or all asynchronous communications are interrupted to handle synchronous traffic. A bandsplitter option is also available to accommodate a maximum of 3 synchronous channels, which share the bandwidth of the composite link with the 680's channel adapters. The 680's flexible configuration, interchangeable channel adapters, and bandsplitter option benefit growing installations with changing requirements. The asynchronous and synchronous channel adapters can be arranged and interchanged to satisfy existing needs as well as future requirements. The Supermux 680D and 680T are dual and triple link models, respectively; however, these units actually contain 2 or 3 separate 680s in 1 enclosure. Channels cannot be swapped among links; in a 680 multilink configuration, if a link fails, the units must be physically recabled for alternate routing. The Supermux 680 is compatible with the 790 Network Concentrator equipped with an appropriate link module.

Console support is an important Supermux 680 feature. Any ASCII-compatible CRT terminal or printer can be attached to a separate reporting channel as an operator console. The console is used to monitor system activity and report system statistics such as line and buffer utilization and event and configuration reports from local or remote 680s. The console may be colocated with the multiplexer or located remotely.

The 790 Network Concentrator is designed for medium-to-large-scale multinode networks. It can accommodate a maximum of 640 channels in any mix of dual asynchronous or synchronous channel adapters. It supports up to 15 (or more) network links and provides link compatibility with the other Supermux models. Channels connected to Supermux Models 380, 480, 600, and 680 can intercommunicate through a 790 node. The 790 can be used to service multiple CPUs, to route data to other points or network nodes in widely scattered geographic locations, and to monitor and control the performance of an entire network from the central computer site or from any 1 of 4 separate locations via a maximum of 4 operator consoles. Console control can be transferred to any 790 unit in the network or to any remote function. Any Teletype-compatible CRT terminal or teleprinter can serve as an operator console. Console functions include event reporting, channel parameter changes and channel-to-channel interconnection changes, diagnostic testing, system statistics, the transfer of console control, and device or system initialization. The console displays a real-time reference for all reported events or status. The console operator can monitor and test any network link and any channel in the local 790 unit and all remote Supermux units. Users requiring assistance can transfer control to Infotron headquarters.

Channel Switching and Contention support for the 790 is similar to the integral switching/contention logic available for the Supermux 600 Series. Two types of switching are offered: Auto-Connect (ACT) and Keyboard Select Routing (KSR). Channel contention allows existing computer resources to be shared, precluding the necessity to add additional ports at added expense when the number of terminals exceeds computer ports. In addition to switching and contention support, the 790 also features a redundant control logic option that eliminates downtime from central logic failure for critical applications.

The 792 Network Concentrator is offered to customers as an

 ©**1984 Data Decisions**

Infotron Statistical Multiplexers, Network Concentrators & Processors
Supermux 380, 480, 600 Series & 680; 790/792NC & 990/992NP

entry-level 790. It offers most of the 790's capabilities at lower cost, and accommodates up to 72 channels. The 792 can be upgraded with 790 logic to support the DIM I/O nest, providing full expansion to 790 maximums.

The 990 Network Processor is designed for large-scale multinode networks. Based on the 790NC architecture, the 990NP utilizes the same exchange bus, card cage, and channel cards. Like the 790, it can accommodate a maximum of 640 channels in any mix of dual asynchronous or synchronous channel adapters. Centralized network control and management functions are handled from any 1 of 4 operator consoles. System and channel configuration information is downline loaded from the 990/992NP to an addressed statistical multiplexer anywhere in the network. The 990's Tandem Switching/Alternate Reconfiguration (TSAR) feature manages all end-to-end data transfer through a series of intervening link modules.

Tandem Switching allows terminal users to access resources anywhere in the network. Alternate reconfiguration automatically reroutes the data path to bypass link failure or node congestion. TSAR is used in a global network of up to 64 990/992NP nodes, with an overall capacity of 59,576 channels (ports). Each node handles up to 928 end-point channels (ports) and up to 1,020 link module channels. A TSAR channel can extend through 2 end-point nodes and 6 transitory nodes. In addition, TSAR supports several criteria with user-selectable thresholds for defining a down link in the network. These criteria include: link open 3 to 60 seconds; buffer full event; and line errors per time period with a specified time period ranging from 5 seconds to 21 minutes.

Another significant 990/992NP feature is the Advanced Network Manager (ANM-800). This standard 990 feature allows network managers to collect traffic statistics and nodal/channel configuration information from all 990/992 processors in a network for review at one location. Consisting of an IBM PC/XT with Infotron proprietary software, ANM-800 supports the altering of network configurations and parameters, the monitoring of network port and link status, and the conducting of diagnostic tests. With ANM-800, channel activity is monitored at each node location. Each remote node employs an Intelligent Device (ID) for auditing conditions and reporting error/status information to the ANM-800 located at the network control center site. ANM-800 uses real-time color graphics displays including network reports, network topology maps and node performance histograms. The network operator selects appropriate ANM-800 features by using function keys to choose one of the system's menu-prompted options. Network topology maps can include regional or global topographical views and can be altered to "zoom in" on a specific node. From the ANM console, node locations can be changed and nodes can be inserted or deleted. In addition, ANM-800 stores node information for displays, including: Average/Peak Buffer Utilization, Average/Peak Characters Per Second, and Inbound and Outbound Line Errors. Performance statistics are generated for 10-minute status reports from every device of every node or from 1 of 16 selectable channels for a period of up to 48 hours. Additional ANM-800 features comprise an Alarm Log, a Message Center, and a host of reports. The following alarm conditions are supported by the Alarm Log: round trip delay threshold exceeded, error threshold exceeded, device initialization, buffer more than 80% filled, line open, node congested, and link down.

The 992 Network Processor is a scaled-down version of the 990NP. It can accommodate a maximum of 104 channels in any mix of dual asynchronous or synchronous channel adapters. The 992NP supports the same feature set as the 990NP and can be expanded to the full capacity of the 990.

Infotron's Advanced Network Integration (ANI) marketing philosophy, which was formally introduced last year, stresses product migration and connectivity. The 990/992NP and 790/792NC products represent the focal point of the ANI approach with the remaining Supermux models functioning as elements in a network configuration. This integrated product strategy has enabled Infotron to remain a viable alternative to users with both small and large networking requirements. In addition, Infotron has retained a dominant position in the high-end statistical multiplexer market. Infotron's strong market position is attributable to its deep penetration of the time division and statistical multiplexer markets. Its customer base consists primarily of large corporations, domestic and foreign communications carriers, and government agencies which operate extensive data communications networks. Infotron has contracts with AT&T for a wide range of products which total 20 percent of the firm's business.

Besides its heavy emphasis on networking products and multiplexers, Infotron produces port selectors, limited-distance modems, and modems, which strengthen its position as a single-source supplier. Its modems range from low-to-medium-speed AT&T-compatible models to high-speed models that can be integrated into its multiplexers. Infotron has also developed a microprocessor controlled PBX, the IS 4000, which can accommodate up to 4,000 terminations and 2,000 simultaneous connections at synchronous or asynchronous rates up to 56K bps.

The company has built a strong reputation for sound, reliable field-proven products.

☐ Strengths

Ease of configuration, network flexibility, supervisory control, and failure recovery are major attributes of the Supermux 600 Series. Channels can be expanded in groups of asynchronous or byte-synchronous quads (4 channels), and configuration and troubleshooting can be performed from a user-supplied or Infotron-supplied supervisory console. Users can option their 600 muxes to accommodate channel switching and contention, with unrestricted size limitations for closed user groups to prevent unauthorized access to restricted channels. The 600 also supports control signal emulation, which allows terminals with different EIA control signal requirements to communicate.

Supermux models 600 and 680 along with 790/792NCs and 990/992NPs are designed for configuration flexibility and ease of expansion to meet user's growth requirements within channel capacity limits. All modules are readily accessible from the front without disturbing cable hook-up. Channel adapters are inserted in vacant slots to accommodate expansion or reconfiguration. The Supermux 380 and 480 are easily upgraded from 4 to 8 channels by the insertion of a second logic board.

Centralized network control via operator console, a strong feature of the 600 Series, alerts the user to abnormal conditions that may occur between local and remote multiplexers, including their DTE/DCE interfaces; allows him to observe performance statistics at local and remote units; lets him conduct diagnostic tests to detect failures so that remedial action can be taken; and allows him to observe existing channel parameters and alter the parameters when necessary.

The bandsplitter option, available for all Supermux models, is useful where there is a need to combine synchronous channels with the composite data stream of the statistical multiplexer. The technique eliminates the delay through the statistical multiplexer.

Automatic Baud Recognition (ABR) eliminates the need for separate speed lines or ports to accommodate terminal equipment with different transmission rates. It is an economic advantage for installations with a large number of low-speed asynchronous terminals that can be satisfied with dial-up facilities.

The communication link protocol employed by Supermux family members is conducive to software demultiplexing as a possible cost-effective alternative to multiplexer hardware at the central computer site. It deserves strong consideration for computer systems that support SDLC/CCITT X.25 Level 2 communications protocol. Not only does this method eliminate the cost of the central site multiplexer, it also reduces the number of computer ports that need to be dedicated to communication.

Multinode support, a strong user benefit of the Supermux 600 Series and 790/792NC and 990/992NP allows data to be exchanged between equipment located at various nodes of a multinode network, and it provides redundant paths to reroute data in case of a link outage. Specific channel/link assignments route data according to user requirements. The multilink capability of the 790 and 990 allows the user to expand a network to meet growing needs. Link compatibility with the other members of the Supermux family via the 790 and 990 compatible link modules supports data paths between them and the other

 ©1984 Data Decisions

Infotron Statistical Multiplexers, Network Concentrators & Processors
Supermux 380, 480, 600 Series & 680; 790/792NC & 990/992NP

models in the same network, and protects the other models from future obsolescence. The 790 acts as a network concentrator to route data to and from other network nodes, hubs, and termination points that may be occupied by other Supermux models. The 990 extends the capabilities of the 790 with its ability to automatically reroute the data path in case of link failure or node congestion. The powerful TSAR function supports resource sharing by allowing channels to contend for available resources in a global network that has distributed databases.

Configuration modularity and flexibility emerge as distinct 790 and 990 advantages. While the 990/992NP offers significant network support with sophisticated features such as TSAR and ANM-800, it is **not** intended to replace the 790/792NC Series. Each product is aimed at a particular segment of the networking marketplace. For users with small-to-medium sized networks needing switching and contention but not the full host of TSAR features, the 790/792NC will remain a viable choice. On the other hand, the 990's full complement of features will appeal to large-scale users as well as users with expanding networking requirements. In addition, since the 990 is based on 790 architecture, a clear migration path exists between the 2 high-end products. Field upgrades for existing 790s consist of several auxiliary modules and PROM revisions; user's existing 790 concentrators are not wheeled out and new 990 boxes wheeled in when users upgrade. Furthermore, users who need to enhance their existing 790s with only selected 990 features such as BSC emulation or TSAR, can acquire special upgrade packages for partial 990 functionality.

Both the 790/792NC and 990/992NP are powerful systems that offer approximately 4 times the maximum channel capacity of competitive systems. Significant user benefits are derived from useful features including ABR recognition and data compression. Both the 790 concentrators and the 990 processors support redundant power systems which is especially important for critical applications that cannot tolerate downtime delays. Also, the comprehensive range of 790 and 990 protocol support eliminates the effect of end-to-end delays. The addition of BSC emulation for the 990 is intended to lessen the amount of bandwidth wasted by polls associated with point-to-point or multipoint bisynchronous signaling. This beneficial feature eliminates the downtime delays caused by multiple satellite hops.

A distinct advantage of the 990/992NP Series is the ANM-800 feature which simplifies network management and control. The supervisory control functions supported by ANM-800 allow the entire network to be controlled from one location. With ANM-800, channel assignments can be altered, nodes can be added and deleted, comprehensive diagnostic tests can be initiated, and network performance can be closely monitored. A valuable asset to network managers, ANM-800 optimizes network efficiency by pinpointing network problems and facilitating the solution to these problems.

☐ Limitations

Infotron employs an Advanced Network Integration (ANI) approach with the 790/792 Network Concentrators and the 990/992 Network Processors as key players. Although newer multiplexer models use different architecture than older models, they can intercommunicate through a 790/792NC or 990/992NP equipped with model-compatible link modules. Still, none of the models in this report can be upgraded past their maximum channel capacity to a larger model except in the case of the 792 and 992 models which can be upgraded to the larger systems. A user who outgrows a Supermux 480, for example, must either add more 480s with additional links (leased lines) or expand to the 792 or 790 Network Concentrators, at considerable cost. This limitation deserves consideration from small-to-medium scale users with plans for future expansion. Medium-scale users with plans to substantially expand their network over an extended period should consider the 790/792NC or 990/992NP Series. The Infotron user who outgrows the capacity of his box is forced to migrate to a larger box at considerable cost, even though the expansion needs may be slight.

The 990/992 Network Processor, in conjunction with other 990/992NPs in a network configuration, can restructure the network in order to bypass faulty links. The user should be alerted to the fact that 990NPs in a network configuration with 790/792NCs cannot automatically reroute traffic. The 990/992NP connected to 790/792NCs can only function in 790/792 mode which only supports **local** switching and contention. Since critical data transmission between the 990 and 790 cannot be rerouted if the link fails, the user must consider either upgrading the 790 to 990 functionality or altering the network configuration to include an additional 990 link.

At this time, the absence of an X.25 link module for the 990/992NP prevents users from connecting to a public packet network such as Telenet or Tymnet. Although an X.25 link module is currently at a beta test site, the delay poses a serious problem to users with an immediate need for X.25 support.

ANM-800 provides the 990/992NP user with extensive supervisory control functions. The system isolates network problems but **doesn't** identify the **cause** because it doesn't measure analog line and digital interface parameters. Degradation conditions aren't specifically identified which could substantially extend the time required to correct the problem and recover the facility.

Another limitation is Infotron's level and degree of support for **priority control**. The need to transmit critical data channels before noncritical channels can be a strong user requirement; in the Supermux line, only the 680 supports user selection of channel priority. Moreover, different levels of priority assignments are often necessary to accommodate channels with different demands. Infotron's priority control for the 680 is limited to one level of priority; i.e., the same level of priority is assigned to all channels selected for priority. Those channels that bear traffic of a more critical nature than others may be interrupted by other priority channels that are less critical.

Supermux 680 and 790 are restricted by a maximum aggregate input rate that was originally designed to handle 1200-bps timesharing terminals. Users with high-speed data entry terminals are limited as to the number of these terminals which can be attached; only 4 9600-bps terminals or 8 4800-bps terminals, for example, can be added to these models (per 9600-/19.2K-bps composite link; wideband links can accommodate higher aggregate) and would preclude the use of any lower-speed terminals. Newer models such as the Supermux 380, 480, and 600 Series have no such restrictions.

The Bandsplitter option, which provides synchronous channel handling for all models, **does not** statistically multiplex the synchronous input with the asynchronous channel aggregate. Except for the 600 Series, the user must specify a portion of the link bandwidth to be permanently assigned to synchronous channels, which not only reduces the amount of bandwidth available for asynchronous terminals, but also results in lost bandwidth between transmissions. In a worst case situation, the bandsplitter could completely choke the flow of data through the statistical multiplexer. The 600 Series supports dynamic bandsplitting, which means that the bandsplitter uses bandwidth only when the synchronous channel(s) are active. Although a better way of accommodating synchronous channels, dynamic bandsplitting could still pose problems for asynchronous terminal users during peak traffic periods when both synchronous and asynchronous channels are active.

Since the departure of the Supermux 580 from Infotron's lineup, there are no Infotron products that can support multipoint polling operations for "dumb" asynchronous terminals. Users who desire this application must either acquire pollable asynchronous terminals and program their CPU or FEP for polling, or acquire multipoint statistical multiplexers from Infotron competitors such as Micom or DCA.

The method by which operating parameter changes are made is another limitation of the Supermux models. Except for the 790/792NC, 990/992NP, and Supermux 600, parameter changes must be made by DIP switch settings on the front panel of the 480 and on individual channel adapters of the 680. Although the settings are clearly marked, it is not the most convenient method to change operating parameters. It is even more inconvenient on the 780 because the channel adapter must be removed to change jumpers on the board. Better approaches to changing operating parameters to satisfy changing

 ©**1984 Data Decisions**

Infotron Statistical Multiplexers, Network Concentrators & Processors

Supermux 380, 480, 600 Series & 680; 790/792NC & 990/992NP

requirements are provided on competitive equipment. For example, the Timeplex Microplexer II uses a front-panel interactive prompting display that scrolls through all possible parameters. The user selects parameters via a select button when the appropriate parameter is displayed. The most convenient method, used by Codex and some other vendors supports parameter changes through an attached channel terminal. The parameter changes are made directly through the terminal keyboard. This technique is used only by the 790/792NC, 990/992NP, and 600 which support parameter changes via a console keyboard.

■ HARDWARE

☐ Terms & Support

Terms • the Supermux and Network Concentrator models are available for purchase or on a 1- or 2-year lease • Infotron provides a lease/purchase credit for a 2-year lease of 5.3 percent of equipment list purchase price • lease rates do not include maintenance • 1-year warranty • discounts on quantity basis for Supermux 480/680/790 • discounts on dollar volume basis for Supermux 780.

Support • equipment can be installed by user or by Infotron; Infotron requires site value of equipment to be at least $2,500 to install; installation is charged at $200 per unit per site; $100 per each additional unit per site • 3 service plans available—out-of-warranty factory service; on-call service; fixed-price service • fixed-price on-site service performed during normal business hours 9:00 AM to 5:00 PM Monday through Friday and billed monthly at 1 percent of equipment list purchase price • on-call service billed at $30 per hour on-site for a maximum of $120 plus $30 per hour travel time to/from site • on-call and fixed-price service performed by Dow Jones at 63 nationwide service locations • telephone consultation and dial-up diagnostics available.

☐ Overview

The 4 models of Infotron statistical multiplexers, 790/792 Network Concentrators, and 990/992 Network Processors are designed for point-to-point, multipoint, multinode, and switching/contention network configurations. The models are available with as few as 4 channels to as many as 640 to satisfy a broad range of network requirements. Multilink models are available with 2, 3, or up to 8 composite network links to support communications between 2 or more nodes in a multinode network. The link protocol, modified SDLC/CCITT X.25 Level II, is common to all Supermux models; block length is variable to 128 characters. All models employ CRC 16 and ARQ error detection and correction over the high-speed composite link.

Individual channel ports accommodate asynchronous data rates from 50 bps to 9600 bps and synchronous rates from 2000 bps to 9600 bps. Channel parameters are switch-selectable and (except for the 780) are downline loadable from the master multiplexer at the central site to the unattended slave multiplexer at the remote site. Channel parameters can also be altered via an optional operator console on the Supermux 600 and 790. Individual channel ports accommodate dial-up or dedicated communications facilities as well as data terminal equipment.

Supermux 380 Configuration • 4- or 8-channel fixed-configuration, standalone or rackmounted unit; field-expandable from 4 to 8 channels • supports asynchronous channels at rates to 9600 bps; 76.8K-bps maximum aggregate channel rate • 1 composite network link; synchronous rates to 19.2K bps • optional integral limited-distance, 2400-bps, or 9600-bps modems for both versions; 9600-bps modem includes bandsplitter for single synchronous channel.

Supermux 480 Configuration • 4- or 8-channel fixed-configuration, standalone or rackmounted unit; field-expandable from 4 to 8 channels • supports asynchronous channels at rates to 9600 bps; 76.8K-bps maximum aggregate channel rate • 1 composite network link; synchronous rates to 9600 bps • master/slave configuration via switch selection • optional 2400-bps or 9600-/4800-bps integral link modems.

Supermux 600 Series Configuration • up to 16/32 channels expandable in 4-channel increments; standalone configuration standard, rackmount optional • supports asynchronous channels at rates to 9600 bps; supports byte-synchronous dynamic bandsplitter channels or protocol-sensitive byte-synchronous channels at rates to 9600 bps • maximum aggregate channel rate 153.6K bps, 16-channel versions; 307.2K bps for 32-channel versions • optional switched or dedicated channels • 1 or 2 composite links; synchronous rates to 19.2K bps, single link, or to 9600 bps each dual link • optional integral 9600-bps link modem.

Supermux 680 Configuration • self-contained, rackmounted base unit • 32 channels maximum • 3 models—680I supports 1 composite network link; 680II supports 2 composite network links; 680III supports 3 composite network links • synchronous link rates up to 9600 bps • accommodates up to 32 asynchronous, 16 synchronous or 32 combined asynchronous/synchronous channels in dual-channel increments • supports channel rates to 9600 bps • maximum aggregate channel rate exceeds 38.4K bps for 680I; 76.8K bps for 680II; 115.2K bps for 680III • maximum channel link assignments for 680II are 12 channels per first link; 14 channels per second link; 6 synchronous channels maximum each link • maximum channel/link assignments 680III are 6 channels per first and second links; 8 per third • bandsplitter option accommodates a maximum of 3 synchronous channels at rates to 14.4K bps; link rates to 19.2K bps • optional 2400-bps or 9600-/4800-bps integral link modems • bandsplitter and modem options are mutually exclusive.

790 Network Concentrator Configuration • rackmounted base and expansion units • 640 channels maximum in any combination of dual or quad asynchronous or synchronous channels • 9600-bps maximum channel rate; 38.4K-bps maximum aggregate channel rate • 15 composite network links maximum; separate link modules compatible with other Supermux models; synchronous link rates to 9600 bps with Supermux 480/680 compatibility; to 19.2K bps with Supermux 780/790 compatibility; to 72K bps with Supermux 790 compatibility • optional 2400-bps or 9600-/4800-bps integral link modems.

792 Network Concentrator Configuration • standalone base unit; rackmount optional • 56 channels maximum in any combination of quad asynchronous or synchronous channels with 1 composite link module • 9600-bps maximum channel rate; 38.4K-bps maximum aggregate rate per quad channel adapter • 15 composite network links maximum; separate link modules compatible with other Supermux models; synchronous link rates to 9600 bps with Supermux 480/680 compatibility; to 19.2K bps with Supermux 780/790/792 compatibility; to 72K bps with Supermux 790/792 compatibility • logic upgrade converts 792 into 790 with full 790 capabilities.

990 Network Processor Configuration • rackmounted base and expansion units • 640 channels maximum in any combination of dual or quad asynchronous or synchronous channels • 9600-bps maximum channel rate; 38.4K-bps maximum aggregate channel rate • 15 composite network links maximum; separate link modules compatible with other Supermux models • optional 2400-bps or 9600-/4800-bps integral link modems.

992 Network Processor Configuration • standalone base unit; rackmount optional • 104 channels maximum in any combination of quad asynchronous or synchronous channels with composite link modules • 9600-bps maximum channel rate; 38.4K-bps maximum aggregate rate per quad channel adapter • 15 composite network links maximum; separate link modules compatible with other Supermux models.

☐ Supermux 380 Multiplexers

Supermux 380 Central Control

Central control module available in 4- or 8-channel packaged configurations with central logic, power supply, 16K RAM buffer, integral channel adapters, and composite link module.

4-Channel 380 • multiplexer configuration with 4 asynchronous

 ©**1984 Data Decisions**

Infotron Statistical Multiplexers, Network Concentrators & Processors
Supermux 380, 480, 600 Series & 680; 790/792NC & 990/992NP

channels and composite link:

$1,750 prch	$17.50 maint

8-Channel 380 • multiplexer configuration with 8 asynchronous channels and composite link:

2,650	26.50

4- to 8-Channel Upgrade • field-installable channel upgrade:

900	9.00

Downline Load • automatically downline loads channel configuration parameters from master to slave unit • standard feature included in package price:

NC	NC

Supermux 380 Flow Control

Guards against multiplexer buffer overflow and against buffer overflow at terminals and resultant loss of data • controls terminal data flow at channel inputs by lowering or raising Clear-To-Send (CTS) on RS-232C interface, or by generating XON/XOFF control characters • flow control performed on individual channel basis • flow suspension threshold at 80 percent total buffer utilization; flow resumption threshold at 60 percent • data lost message transmitted to appropriate channels in response to buffer overflow condition when terminal ignores overflow prevention measures:

NC prch	NC maint

Link Outage Recovery • sends a link outage message to all channels after 90 seconds of continuous inbound or outbound errors • sends message in response to 2 escape characters and an ENQ character • standard feature included in Fully Featured Supermux 380 pricing:

NC	NC

Supermux 380 Diagnostic Tests

Standard 380 Fully Featured test features include Local Loopbacks, System Loopbacks, Channel Tests, and Modem Loopbacks and Self-Test • Local Loopbacks initiated at either end of system; unit initiating test is looped back on itself, testing multiplexer internal operation and sending test data back to originating channels • System Loopbacks initiated at either end of system; loops data at remote multiplexer, testing the multiplexer initiating the test and analog line facilities • Channel Tests initiated at operator terminals, testing individual channels and/or system operation via local/remote digital loopback tests; sends individual data characters or test patterns of 75 data characters • Modem Loopbacks and Self-Test available for units with integral modem options; permits local/remote analog loopback and remote digital loopback tests to be performed from the modem; self-test feature tests both modems and the composite link • all testing performed from individual operator terminals or from 380 Fully Featured internal DIP switches • standard feature included in package price:

NC prch	NC maint

Supermux 380 Status Reporting

LED status display panel indicates results of performance monitoring; indicates normal/abnormal operating conditions; transmitted/received errors on the composite link; and loopback condition • standard feature included in package price:

NC prch	NC maint

Supermux 380 Channels

Central control module packaged with 4 or 8 asynchronous channels • synchronous bandsplitter available with 9600-bps modem option provides single synchronous channel at 2400-, 4800-, or 7200-bps data rate • asynchronous switch-selectable rates of 50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2400, 4800, or 9600 bps; maximum aggregate input rate of 76.8K bps • 5, 6, 7, 8, 9, 10, or 11 data bits per character including stop bits and parity • passes up to 4 full-duplex EIA control signals • channels can be reconfigured individually • EIA RS-232C/CCITT V.24/V.28 electrical interface standard, or optional 20-/60-mA current-loop interfaces.

Automatic Baud Recognition • regulates asynchronous channel rate to rate of dial-up line • switch-selectable on individual channel basis • 110-, 134.5-, 150-, 300-, 600-, and 1200-bps rate • CR or Memorex convention • standard feature included in package price:

NC prch	NC maint

Neutral Current Interface • external adapter for 20-/60-mA systems • attaches to an asynchronous channel port on channel adapter:

50	0.50

Polar Current Interface • external adapter for +/-60 volt, 60-mA systems • attaches to asynchronous channel port on channel adapter:

75	0.75

Supermux 380 Composite Link

Central control module packaged link • synchronous up to 19.2K bps; isochronous at 300/1200/9600/19.2K bps; external clock • synchronous up to 2400/4800/7200 bps with bandsplitter option on 9600-bps modem • SDLC-like, CCITT X.25 Level 2 protocol • CRC and ARQ error detection and correction • EIA RS-232C/CCITT V.24/V.28 electrical interface.

Integral Limited Distance Modem • asynchronous 300/1200/9600/19.2K-bps integral modem for operation over 4-wire metallic circuit • distances up to 18 miles depending on data rate and wire gauge • AT&T spec 43401 compatible • occupies designated slot within Supermux 380 central control module:

$190 prch	$0.19 maint

SM380/2400 Integral Modem • synchronous 2400-bps full-duplex integral modem for operation over 4-wire dedicated Type 3002 lines • AT&T 201C compatible; CCITT V.26B compatible • compromise equalization • occupies designated slot within Supermux 380 central control module:

700	7.00

SM380/9600 Integral Modem • synchronous 9600-/4800-bps full-duplex integral modem for operation over unconditioned 4-wire dedicated Type 3002 lines • CCITT V.29 compatible • automatic adaptive equalization • includes synchronous channel input (bandsplitter) for single synchronous device to share composite link with asynchronous composite at 2400, 4800, or 9600 bps • occupies designated slot within Supermux 380 central control module:

2,750	27.50

☐ Supermux 480 Multiplexers

Supermux 480 Central Control

Central control module available in 4- or 8-channel packaged configurations with central logic, power supply, 16K RAM buffer, integral channel adapters and composite link module, and power supply.

4-Channel Supermux 480 • multiplexer configuration with 4 asynchronous channels and composite link:

$1,900 prch	$19.00 maint

8-Channel Supermux 480 • multiplexer configuration with 8 asynchronous channels and composite link:

2,900	29.00

4- to 8-Channel Upgrade • field-installable channel upgrade:

1,300	10.00

PM790/SMID PROM Kit • enables remote Supermux 480 to function with a 790 Network Concentrator equipped with Switching and Contention Intelligent Device (SCID) • see 790 Channel Routing for details:

100	10.00

Downline Load • automatically downline loads channel configuration parameters from master to slave unit • standard

PRCH: single unit purchase price. MAINT: monthly maintenance for fixed-price service. NA: not available. NC: no-charge item. Prices are current as of November 1984.

 ©1984 Data Decisions

Infotron Statistical Multiplexers, Network Concentrators & Processors
Supermux 380, 480, 600 Series & 680; 790/792NC & 990/992NP

feature included in package price:

NC	NC

Supermux 480 Flow Control & Recovery

Flow Control • standard Supermux 480 feature that guards against buffer overflow and resultant loss of data • controls terminal data flow at channel inputs by lowering or raising Clear-To-Send (CTS) on RS-232C interface, or by generating XON/XOFF control characters • flow control performed on individual channel basis • flow suspension threshold at 80 percent total buffer utilization; flow resumption threshold at 60 percent • data lost message transmitted to appropriate channels in response to buffer overflow condition where terminal ignores overflow prevention measures:

NC prch	NC maint

Optional Flow Control • mutually exclusive with data lost/link out messages and with 90-second drop feature • partitions the 16K RAM buffer into individual channel transmit and receive buffers (queues); queue capacity is 1.75K bytes for 8-channel units and 2.75K bytes for 4-channel units • detects and generates flow control characters or signals; prevents channel from monopolizing or shutting down multiplexer; prevents buffer overflow and loss of data at terminal; reduces transmission delay to 0.25 seconds per 9600-bps channel rate each direction • ASCII flow control characters selectable from DC1/DC2 (start); DC2/DC3/DC4 (stop) • master and slave units may use different flow control protocol; all channels within same unit must use same protocol • interface signals use pins 5 and 11 of RS-232C interface to control data flow; a no-cost option unless field installed:

300	3.00

Link Outage Recovery • standard Supermux 480 feature • buffer handles outages up to 10 seconds on fully loaded line • extended outages handled by switchable 90-second drop feature that retains buffered data and control signals until link is restored, or, alternately, clears buffered data 90 seconds after link outage; link out message transmitted to channel in response to ENQ:

NC	NC

Supermux 480 Diagnostic Tests

Multiplexer-Initiated Testing • standard Supermux test features include Test Loop, Modem Digital Loop, and Modem Analog Loop procedures • Test Loop initiated at either end of system; unit initiating test is looped back on itself, and test pattern forwarded to remote unit; local unit checks remote return of pattern to verify condition of both multiplexers, both modems, and line • Modem Digital Loop entails looping back data at digital side of modem, verifying multiplexer operation under test and ensuring that telephone facilities are not looping back customer data circuits • Modem Analog Loop similar to Digital Loop, except that data is looped on the analog line side of modem:

NC prch	NC maint

480/DIAG Terminal-Initiated Testing • optional feature for terminal-initiated testing • permits testing from any ASCII terminal attached to multiplexer for Remote Loop, Local Loop, Local Pattern, and Remote Pattern procedures • Remote Loop multiplexes characters entered from terminal to remote end for loopback to terminal for verification • Local Loop multiplexes characters from terminal to local multiplexer for loopback to terminal • Local Pattern transmits test pattern from local multiplexer to terminal • Remote Pattern transmits pattern from remote multiplexer to terminal:

100	1.00

Supermux 480 Channels

Central control module packaged with 4 or 8 channels • asynchronous switch-selectable channel rates of 50, 75, 110, 134.5, 200, 300, 600, 1200, 1800, 2400, 4800, or 9600 bps; maximum aggregate input rate of 76.8K bps • 5, 6, 7, or 8 data bits; Baudot, ASCII, or IBM codes • EIA RS-232C (standard) or 20-/60-mA loop interfaces.

480/ABR Automatic Baud Recognition • regulates asynchronous channel rate to rate of dial-up line • switch-selectable on individual channel basis • 110-, 134.5-, 150-, 300-, 600-, and 1200-bps rate • CR/Memorex convention:

$200 prch	$2.00 maint

480/SBS Bandsplitter • allows multiplexing of 1 to 3 synchronous channels on composite link • 600-, 1200-, 1800-, 2400-, 4800-, 7200-, or 9600-bps data rates; maximum aggregate input rate equal to composite link rate (19.2K bps maximum):

600	6.00

Neutral Current Interface • external adapter for 20-/60-mA systems • attaches to an asynchronous channel port on channel adapter:

50	0.50

Polar Current Interface • external adapter for +/-60 volt, 60-mA systems • attaches to asynchronous channel port on channel adapter:

75	0.75

Supermux 480 Composite Link

Central control module packaged link • up to 9600 bps synchronous, or 300, 1200, and 1800 bps isochronous, switch-selectable • up to 2400, 4800, 9600, or 19.2K bps synchronous with bandsplitter option • SDLC and CCITT X.25 Level 2 protocol • CRC and ARQ error detection and correction • EIA RS-232C/CCITT V.24/V.28 interface.

SM480/2400 Integral Modem • synchronous 2400-bps full-duplex integral modem for operation over 4-wire dedicated Type 3002 lines • AT&T 201C compatible; CCITT V.26B compatible • compromise equalization • occupies designated slow within Supermux 480 central control module:

$700 prch	$7.00 maint

SM480/9600 Integral Modem • synchronous 9600-/4800-bps full-duplex integral modem for operation over unconditioned 4-wire dedicated Type 3002 lines • CCITT V.29 compatible • automatic adaptive equalization • occupies designated slot inside Supermux 480 housing:

2,750	27.50

☐ Supermux 600 Series Multiplexer

Supermux 600 Series Central Control

Central control module contains central logic, power supply, 16K-byte ROM memory, 32K-byte RAM memory, 2K-byte EPROM, and composite link module; accommodates up to 4 or 8 4-channel adapters, 16 or 32 channels maximum; 2K-byte RAM buffer per each 4 channels.

Models with dual composite links can be used in traffic bypassing or alternate routing network configurations • traffic bypassing supports communication among 3 nodes using only 2 composite links, 1 to link each single-link remote node to a dual-line central node; channels communicating between remote nodes bypass the central node • alternate routing adds a third composite link between dual-link remote nodes in a 3-node network to provide an alternate route (through channel bypassing) in event of link outage, and to eliminate delay time for channels bypassed through the central node; requires dual-link models for each node • nodes added in a ring configuration • each multiplexer dual-link node can store 2 routing tables, 1 primary and 1 secondary route; programmed through the supervisory port and automatically downline loaded to node multiplexers • channel bypassing and alternate routing are natural subsets of models with switching and contention:

NC prch	NC maint

Supermux 616 Single Link • supports any combination of up to 16 asynchronous/synchronous channels and single composite link:

2,500	25.00

Supermux 616 Single Link With Switching/Contention • supports any combination of up to 16 asynchronous/synchronous channels and single composite link • contains additional logic for channel switching and contention:

2,750	27.50

 ©1984 Data Decisions

Infotron Statistical Multiplexers, Network Concentrators & Processors
Supermux 380, 480, 600 Series & 680; 790/792NC & 990/992NP

Supermux 616 Dual Link • supports any combination of up to 16 asynchronous/synchronous channels and 2 composite links:

3,250	32.50

Supermux 616 Dual Link With Switching/Contention • supports any combination of up to 16 asynchronous/synchronous channels and 2 composite links • contains additional logic for channel switching and contention:

3,500	35.00

Supermux 632 Single Link • supports any combination of up to 32 asynchronous/synchronous channels and single composite link:

3,000	30.00

Supermux 632 Single Link With Switching/Contention • supports any combination of up to 32 asynchronous/synchronous channels and single composite link • contains additional logic for channel switching and contention:

3,250	32.50

Supermux 632 Dual Link • supports any combination of up to 32 asynchronous/synchronous channels and 2 composite links:

3,750	37.50

Supermux 632 Dual Link With Switching/Contention • supports any combination of up to 32 asynchronous/synchronous channels and 2 composite links • contains additional logic for channel switching and contention:

4,000	40.00

Downline Load • automatically downline loads channel configuration parameters from master to slave unit(s) • standard feature included in package price:

NC	NC

Rackmount Option • rackmount option for 16- or 32-channel models; mounts single unit:

75	NC

Supermux 600 Series Flow Control

Guards against multiplexer buffer overflow and against buffer overflow at terminals and resultant loss of data • controls terminal data flow at channel inputs by lowering or raising Clear-To-Send (CTS) on RS-232C interface, or by generating XON/XOFF control characters • flow-control performed on individual channel basis • flow suspension threshold at 80 percent total buffer utilization; flow resumption threshold at 60 percent • data lost message transmitted to supervisory console upon buffer overflow • standard feature included in package price:

NC prch	NC maint

Supermux 600 Series Diagnostic Tests

Isolates failures in local/remote channels, composite link, modems, and in local/remote multiplexers • local/remote digital loopback and local/remote analog loopback of terminal-entered data; activated via internal DIP switches or from supervisory console • internal test pattern generator sends a recurrent "barber pole" ASCII test pattern for loopback testing; activated from supervisory console only • self-test of internal circuitry performed on power-up • standard feature included in package price:

NC prch	NC maint

Supermux 600 Series Status Reporting

Status information is available from LED indicators on central control module and each quad-channel module, located behind unit's front panel, or from user-supplied ASCII terminal connected to supervisory port • central logic LEDs indicate power on, multiplexer ready, error condition, and test condition • channel module LEDs indicate data activity for each channel • supervisory control terminal provides user with information on system initialization, inbound/outbound errors, buffer overflows, configuration files, and composite link failures • standard feature included in package price:

NC prch	NC maint

Supermux 600 Series Channels

Central control module supports up to 4 or 8 quad-channel adapters • asynchronous, protocol-insensitive synchronous, or protocol-sensitive synchronous channels • CA600/4 quad-channel adapter provides combinations of asynchronous or synchronous dynamic bandsplitter (protocol insensitive) channels; CA600/S4 quad-channel adapter provides protocol dependent (protocol sensitive) channels at established data rates • asynchronous data rates at 50, 75, 110, 134.5, 150, 200, 300, 600, 1050, 1200, 1800, 2000, 2400, 4800, 7200, or 9600 bps; maximum aggregate input rate of 153.6K bps, 16-channel models; 307.2K bps, 32-channel models • 5 through 8 data bits per character • odd or even parity • 0, 1, 1.5, or 2 stop bits • passes up to 4 full-duplex EIA control signals • channel parameters configured from internal DIP switches or from user-supplied ASCII terminal connected to supervisory port • standard EIA RS-232C/CCITT V.24/V.28 electrical interface.

CA600/4 Asynchronous/Synchronous Channel Adapter • provides 4 channel inputs for full-duplex asynchronous and/or half-duplex BSC communication • synchronous channels dynamically allocated bandwidth from composite link; asynchronous channels (if any) assigned remaining bandwidth • occupies 1 slot in 4-slot or 8-slot enclosure • not included in package price:

$750 prch	$7.50 maint

CA600/4 Async/Sync Channel Adapter With Switching/Contention • same as CA600/4 but with channel logic for switching and contention • used with 16- and 32-channel units with switching/contention central logic • occupies single slot in 4-slot or 8-slot enclosure • not included in package price:

950	9.50

CA600/S4 Synchronous Channel Adapter • provides 4 channel inputs for half-duplex BSC communication • supports IBM 3270/2780/3780; Honeywell GRTS/VIP; Control Data UT200; and Burroughs Bisync protocols • standard data rates up to 9600 bps, DIP switch or supervisory console selectable • occupies single slot in 4-slot or 8-slot enclosure • not included in package price:

1,000	10.00

CA600/S4 Sync Channel Adapter With Switching/Contention • same as CA600/S4 but with channel logic for switching and contention • used with 16- and 32-channel units with switching/contention central logic • occupies single slot in 4-slot or 8-slot enclosure • not included in package price:

1,200	12.00

Automatic Baud Recognition • regulates asynchronous channel rate to rate of dial-up line • selectable on individual channel basis • 110-, 134.5-, 150-, 300-, 600-, and 1200-bps rate, CR or Memorex convention; 1200 to 9600 bps, CR convention • standard feature included in package price:

NC	NC

Control Terminal Port Support • dedicated supervisory port supports Portable Keyboard/Display Unit or user-supplied ASCII terminal • provides online diagnostic testing; channel configuration programming; alternate configuration programming and testing; display of system configuration and event reports; and display of system statistics including composite link utilization and event summaries • ASCII terminal can be colocated or remotely located from multiplexer; supports terminal data rates to 9600 bps as well as dial-up modems • standard feature included in package price:

NC	NC

Portable Keyboard/Display Unit • optional console panel with alphanumeric keypad and single-line LCD display; used in lieu of user-supplied ASCII terminal • provides operator interaction with system supervisory functions • flat panel design mounts on inside cover of multiplexer front panel; folds down for use • detaches for portability between different Supermux 600 sites • extra-cost option:

625	6.25

 ©1984 Data Decisions

Infotron Statistical Multiplexers, Network Concentrators & Processors
Supermux 380, 480, 600 Series & 680; 790/792NC & 990/992NP

600 Series Channel Routing

All channels on units with Switching/Contention logic can be programmed as either switched or dedicated. Switched networks comprised of Supermux 600 Multiplexers are configurable in up to 3 nodes with any mix of single-link or dual-link Switching/Contention models. One node must be supplied with an ASCII terminal or Infotron's Portable Keyboard/Display Unit to program logical channel connections.

Programmable channel assignments include keyboard select routing channels (KSR), Auto Connect channels, and Dedicated channels. KSR and Auto Connect channels are available for asynchronous devices only. KSR channel users can select 1 of several destination channels, with or without contention. Auto Connect channels always connect to same destination channel while active; they can also contend with other channels for access to same port. When Auto Connect channels become inactive, the logical connection is broken, allowing link bandwidth to be used by other channels. Dedicated channels can be assigned to either asynchronous or synchronous devices; logical connections are permanently assigned to a single receiving channel, and link bandwidth is always available for a dedicated channel. Dedicated routing information can be changed via the supervisory port only.

Restricted Access Groups can be assigned to Supermux 600 nodes, allowing access to sensitive resources to be restricted to specific users, and/or allowing users to contend for a group of channels instead of individual channels. Supermux 600 configurations can accommodate a maximum of 21 Restricted Access Groups, up to 7 per node; each group can contain up to 16 or 32 channels, depending on the multiplexer model. Channels within a group can be called by other channels or can initiate calls; dedicated channels cannot access Restricted Access Groups. A channel within a group can be accessed by a group address, whereby any available channel services a call, or individual channels within a group can be called directly. Channels in Restricted Access Groups do not have to be contiguous.

Switching/Contention multiplexers can also provide EIA control signals for terminals that do not support them (control signal emulation), up to a maximum of 4 control signals per channels. This capability can be supported at either 1 or both ends of the connection. Existing control signals can also be **complemented**, again up to a maximum of 4 signals; dedicated users can thus be connected to dial-up ports, for instance.

Switching/Contention multiplexers also support terminal-to-terminal or terminal-to-CPU communication at a single node, performing as a data PBX and bypassing composite link communication. Switching models support up to 96 connections (3 nodes with Supermux 632s); i.e., up to 48 simultaneous/virtual circuits.

Supermux 600 Series Composite Link

Central control module packaged link • synchronous data rates to 19.2K bps for single-link models; to 9600 bps per link for dual-link models • point-to-point communication over single link; dual-link models required for master site and optionally for remote sites in triple-node networks only, for communication with 2 remote nodes • modified CCITT X.25 Level II, SDLC-like link protocol; block lengths up to 64 characters, adjusted dynamically • CRC 16 and ARQ error detection and correction • standard EIA RS-232C/CCITT V.24/V.28 electrical interface included in package price:

NC prch	NC maint

SM600/9600 Integral Modem • synchronous full-duplex at 9600-/4800-bps integral modem for operation over unconditioned 4-wire dedicated Type 3002 lines • CCITT V.29-/V.27-compatible • automatic adaptive equalization • occupies designated slot within Supermux 616 or 632 central control module:

2,750	27.50

☐ Supermux 680 Multiplexers

Supermux 680S (Single Link) • basic controller frame with power supply, central controller module with 32K-byte RAM buffer storage and single composite link, and a reporting and diagnostic module • provides 16 card slots for dual input channel adapters plus an additional slot for either bandsplitter module or composite link modem • maximum aggregate asynchronous channel rate 38.4K bps:

$3,000 prch	$30.00 maint

Supermux 680D (Dual Link) • basic controller frame with power supply, 2 central control modules each with 32K-byte RAM buffer storage and composite link, and 2 reporting and diagnostic modules • provides 13 card slots for dual input channel adapters plus an additional slot for either bandsplitter module or composite link modem • 7 of the 13 channel adapter slots assigned to first composite link; 6 assigned to second link • maximum aggregate asynchronous channel rate per composite link 38.4K bps:

4,100	41.00

Supermux 680T (Triple Link) • basic controller frame with power supply, 3 central logic modules each with 32K-byte RAM buffer storage and composite link, and 3 reporting and diagnostic modules • provides 10 card slots for dual input channel adapters plus an additional slot for either bandsplitter module or composite link modem • 3 of the 10 channel adapter slots assigned to first composite link; 3 assigned to second link; 4 assigned to third link • maximum aggregate asynchronous channel rate per composite link 38.4K bps:

5,200	52.00

PM790/SMID PROM Kit • enables remote Supermux 680 to function with a 790 Network Concentrator equipped with Switching and Contention Intelligent Device (SCID) • see 790 Channel Routing for details:

200	10.00

Downline Load • automatically downline loads channel configuration parameters from master to slave unit • standard feature included in package price:

NC	NC

Supermux 680 Flow Control

Guards against buffer overflow resulting in loss of data • controls flow of data from data terminal equipment at channel inputs by lowering or raising Clear-To-Send (CTS) on the EIA RS-232C channel interface or by generating XON/XOFF control characters • flow control performed on individual channel basis • flow suspension threshold established at 80 percent total buffer utilization and at 1.5K-byte limit for individual channel queue; flow resumption threshold at 60 percent buffer utilization and at 0.25K-byte limit for individual channel queue • guards against buffer overflow at terminals resulting in loss of data; detects and responds to XON/XOFF flow control characters or interface signals from terminals by suspending/resuming data flow to channel outputs:

NC prch	NC maint

Supermux 680 Diagnostic Tests

Isolates failures in local/remote central controller module, local/remote channel composite link modems, or composite link through test message or pattern generation and loopback points • central controller module conducts self-test of local/remote SM 680s, and composite link via test message and loopback; establishes remote loopback through all remote SM 680 channels • reporting and diagnostic module provides indicator lamps and switches to conduct local/remote channel tests via test message/pattern generation to selected local/remote channel with/without loopback • individual interface control signals at selected local/remote channel can be activated • indicators display data or control signals of selected local/remote channel • bandsplitter loopback paths can be established at individual channels or composite output • integral modems provide local/remote analog/digital loopback and test pattern generation/detection:

NC prch	NC maint

Supermux 680 Status Reporting

Reports abnormal conditions such as errors or failures; line and

 ©1984 Data Decisions

Infotron Statistical Multiplexers, Network Concentrators & Processors
Supermux 380, 480, 600 Series & 680; 790/792NC & 990/992NP

buffer utilization; local/remote channel parameters • reports displayed or printed on user-supplied ASCII terminal • entered messages transmitted to selected local/remote channel • report line entries include real-time and location • console resettable clocks:

NC prch	NC maint

Supermux 680 Channels

Central basic frame module supports 16 card slots for dual-channel adapters (32 channels maximum), and slot for either bandsplitter or high-speed modem • asynchronous switch-selectable rates of 50, 75, 110, 134.5, 200, 300, 600, 1200, 1800, 2400, 4800, or 9600 bps; maximum aggregate input rate of 38.4K bps • synchronous switch-selectable speeds of 2000, 2400, 3600, 4800, 7200 or 9600 bps; 600, 1200, and 14.4K bps also with bandsplitter • 5, 6, 7, or 8 data bits; Baudot, ASCII, or IBM codes • EIA RS-232C (standard) or 20-/60-mA loop interfaces.

CA680/2A4 Asynchronous Channel Adapter • dual-port full-duplex asynchronous channel adapter • requires slot on central control module:

$350 prch	$3.50 maint

CA680/2S4 Synchronous Channel Adapter • dual-port half-duplex synchronous channel adapter • requires slot on central control module:

800	8.00

CA680/2S4-BSC Synchronous Channel Adapter • dual-port half-duplex synchronous microprocessor-based channel adapter • IBM BSC protocol sensitive to 2780, 3780, 3270, and 360/20 HASP multileaving protocols • unbuffered; data statistically multiplexed with data from other synchronous/asynchronous channels • sync fill bytes inserted during transmission gaps • requires slot on central control module:

800	8.00

CA680/3BSM Bandsplitter • allows multiplexing of 1 to 4 full-duplex synchronous channels on composite link • 600-, 1200-, 2400-, 4800-, 7200-, 9600-, or 14.4K-bps data rates; maximum aggregate input equal to composite link rate (19.2K bps maximum) • requires slot on central control module • cannot be used with integrated modem:

650	6.50

680 Automatic Baud Recognition • regulates asynchronous channel rate of dial-up line • switch-selectable on individual channel basis • 110-, 134.5-, 150-, 300-, 600-, and 1200-bps rate • CR/Memorex convention • included with CA680/2A4 Asynchronous Channel Adapters:

NC	NC

Priority Control • switch-selectable priority/no priority for individual channels • all selected channels have same priority level • standard with 680 central module:

NC	NC

Neutral Current Interface • external adapter for 20-/60-mA devices • attaches to asynchronous channel port:

50	0.50

Polar Current Interface • external adapter for +/-60V, 60-mA devices • attaches to asynchronous channel port:

75	0.75

Supermux 680 Composite Link

Central control module packaged link channel(s); up to 3 maximum • up to 9600-bps synchronous rate • up to 2400-, 4800-, 9600-, or 19.2K-bps synchronous with bandsplitter option • SDLC and CCITT X.25 Level 2 protocol • CRC and ARQ error detection and correction • variable block length to 128 characters • EIA RS-232C/CCITT V.24/V.28 interface.

SM680/2400 Integral Modem • synchronous full-duplex 2400-bps integral modem for operation over 4-wire dedicated Type 3002 lines • AT&T 201C-compatible; CCITT V.26B-compatible • compromise equalization • occupies designated slot within Supermux 680 central control module:

$700 prch	$7.00 maint

SM680/9600 Integral Modem • synchronous full-duplex 9600-/4800-bps integral modem for operation over unconditioned 4-wire dedicated Type 3002 lines • CCITT V.29/V.27 bis compatible • automatic adaptive equalization • occupies designated slot within Supermux 680 central control module:

2,750	27.50

☐ 790/792 Network Concentrator

790 Central Control

System Rack or Controller Nest contains overall system logic, and supports channel adapters and composite link modules through various interface, nest, and link modules. In addition, System Rack provides room for redundant components. The Controller Nest by itself is designed for user-provided rack enclosures.

790/CNR Controller Nest • contains Mod II Central Logic Modules, Reporting/Configuration Module, and 15 card slots • supports single 790 Redundant Central Logic Set (RCL), 3 slots; any combination of up to 15 LM790E, LM480, LM680, or LM780 Link Modules, single slot each; and/or up to 7 LM790V Link Modules, 2 slots each; and/or up to 10 CL790/DIM Dual I/O Interface Modules, 1 slot each; and/or up to 15 4M4 Quad Channel Adapters, single slot each • can accommodate 790/SCID Switching and Contention module; fits special logic slot • requires PS790 Power Supply/Cooling Pack (PCPACK) and single 40CP power supply • fits standard 19-inch equipment cabinet:

$4,600 prch	$46.00 maint

XN790/32 Single I/O Expansion Nest • contains I/O controller logic including Channel Controller Module and FIFO Read Module • supports up to 16 CA790 Series Dual Channel Adapters • requires attachment to CL790/DIM Nest Interface Module (up to 2 per interface); also requires PS790 or 790/I/O-PR Power Supply support:

2,810	28.00

CL790/DIM Dual I/O Nest Interface Module • supports up to 2 XN790 I/O Expansion Nests • up to 10 per SM790/CN Controller Nest:

770	77.00

790/CRR System Rack • a 72-inch cabinet with power status panel; contains a 790 Controller Nest (CNR) and 790 Rack Controller Nest Power Supply (CPR); includes space for redundant components • supports an additional CPR, up to 4 790 I/O Expansion Rack Nests, and up to 8 790 I/O Nest Power Supplies (I/O-PR):

7,580	76.00

790/RCL Redundant Central Logic • includes Mod II Central Logic, a System Controller Logic, a Reporting/Configuration Module, and a Switchover Logic Module • fits 790 System Racks:

5,060	50.00

790/RCLC Redundant Central Logic Upgrade • replaces Mod I System Controller Logic with Redundant Mod II Logic • includes 1 Switchover Logic Module, 2 Reporting and Configuration Modules, and 2 System Controller Modules • fits 790 System Racks:

7,760	78.00

790/CPR Controller Nest Power Supply • redundant power supply for 790 System Rack • mounts on rear door of 790 System Rack only:

1,210	12.00

790/I/O-PR I/O Nest Power Supply • redundant power supply for 790 System Rack • mounts on rear door of 790 System Rack only:

990	10.00

PS790/40CP Power Supply • powers SM790/CN Controller Nest, or 2 XN790 I/O Expansion Nests • requires SM790 Power/Cooling Pack; fits non-Infotron 19-inch equipment cabinets:

990	10.00

 ©1984 Data Decisions

Infotron Statistical Multiplexers, Network Concentrators & Processors
Supermux 380, 480, 600 Series & 680; 790/792NC & 990/992NP

PS790/PC Pack Power/Cooling Pack • provides cooling and power distribution facilities for up to 3 PS790 Power Supply modules; fits non-Infotron 19-inch equipment cabinets:

660 6.60

Downline Load • automatically downline loads channel configuration parameters from master to slave unit • standard feature included in package price:

NC NC

792 Central Control

The 792 Base Unit/Redundant Base Unit contains overall system logic and supports channel adapters and composite link modules.

792/CN Base Unit • standalone unit contains Mod II Central Logic, Reporting/Configuration Module, a 792/CPR Load Sharing Power Supply, and 15 card slots • can accommodate single 792 Redundant Central Logic set (RCL), 3 slots; up to 15 LM792E, LM480, LM680, or LM780 Link Modules, single slot each; and/or up to 7 792V Link Modules, 2 slots each; and/or up to 13 4M4 Quad Channel Adapters, single slot each • supports an additional 792/CPR power supply • can accommodate the 792/SCID Switching and Contention module; fits special logic slot • tabletop-mounted unit measures 16.75 inches high by 17.59 inches wide by 18.75 inches deep:

$4,800 prch $48.00 maint

792/CNR Redundant Base Unit • same as 792/CN but contains redundant 792/CPR power supply, redundant Central Logic set, and 13 card slots:

8,430 84.30

792/23RM or 19RM • rackmount kit for 23-inch or 19-inch equipment cabinets; includes 2 brackets:

80 NA

792/RCL Redundant Central Logic Set • includes Mod II Central Logic, Reporting and Configuration Module, and a Switchover Logic Module:

4,180 41.80

792/790 Upgrade Kit • upgrades 792 to full 790 Central Logic support • accommodates 790 DIM I/O modules • 2 kits required for redundant Central Logic:

1,000 10.00

790-to-990 System Upgrade

790/990NPRSL Nonredundant System Upgrade Kit • upgrades 790 to full 990 functionality including BSC Emulation, TSAR, and ANM-800 • nonredundant system:

$11,800 prch $118.00 maint

790/990NPDSL Redundant System Upgrade Kit • upgrades 790 to full 990 functionality including BSC Emulation, TSAR, and ANM-800 • redundant system:

16,000 160.00

790/792 Flow Control

Flow control guards against buffer overflow resulting in loss of data; controls the flow of data from data terminal equipment at channel inputs by lowering or raising Clear-To-Send (CTS) on the EIA RS-232C channel interface or by generating XON/XOFF control characters • flow control performed on individual channel basis; different flow control techniques can be implemented for either end of each channel • flow suspension threshold established at 87.5 percent total buffer utilization; flow resumption threshold at 75 percent buffer utilization • also guards against buffer overflow at terminals resulting in loss of data; detects and responds to XON/XOFF flow control characters or interface signals from terminals by suspending/resuming data flow to channel outputs.

790/792 Diagnostic Tests

Diagnostic testing is conducted through a user-supplied ASCII CRT/keyboard console via keyed commands and displayed results • operator-selected tests are executed on a specific device and channel; results displayed on CRT screen; device specified as Link Module or I/O Nest on local or remote concentrator throughout network • testing performed via menu-selected test procedures, test messages or patterns, and specified loopback paths • single character or barber pole test patterns to selected device/channel • keyed message to/from specified device/channel • loop/unloop specified device/channel • elapsed time measurement of transmission via selected device/channel loopback path • read/set control signal levels at specified device/channel • display loopback table presents all channels set to loopback.

790/792 Status Reporting/System Control

Operator-prompted system interaction through 1 to 4 user-supplied ASCII keyboard/CRT consoles; 1 or 2 central-site consoles; 1 or 2 remote channel-attached consoles • information presented and functions executed in response to keyed console commands; controls all 790s and compatible Supermux units in network • 5 function categories include system configuration; event reporting; performance statistics; diagnostics; and miscellaneous functions • system configuration mode displays and accepts changes to unit number/name; device parameters; and channel parameters; lists changes in change table with options to delete each change or establish on a temporary or permanent (enter in EPROM) basis • event reporting lists abnormal conditions including errors or failures and their location; and improper or critical conditions as they occur or when requested; events displayed for specific device or all system devices • performance status mode reports each statistic with time and location at 10-minute intervals; reports on specific devices or all devices in network • diagnostic mode executes operator-selected tests and displays results.

790/792 Channels

790/CN Controller Nest supports up to 640 channels via up to 10 CL790/DIM Nest Interface Modules and associated XN790 I/O Expansion Nests; 792/CN supports up to 72 channels with composite link modules; all parameters selectable via system operator console • asynchronous selectable rates of 50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2400, 4800, or 9600 bps; maximum aggregate input rate of 38.4K bps per Expansion Nest • synchronous selectable rates of 1200, 1800, 2000, 2400, 3600, 4800, 7200, or 9600 bps • 5, 6, 7, or 8 data bits; Baudot, ASCII, or IBM codes • RS-232C (standard) or 20-/60-mA loop interfaces.

CA790/2A4 Dual Asynchronous Channel Adapter • dual-port full-duplex asynchronous channel adapter • rates up to 9600 bps • requires card slot on XN790 Series I/O Expansion Nest:

$440 prch $4.40 maint

CA790/2S4 Dual Synchronous Channel Adapter • dual-port full-duplex synchronous channel adapter • point-to-point or multipoint at rates to 9600 bps • compatible with BSC protocol for support of IBM 2780, 3780, 3270, and 360/20 HASP terminals; GRTS; 4T200; VIP; Burroughs; Uniscope; ICL; and DDCMP protocol support • requires card slot on XN790 Series I/O Expansion Nest:

940 9.40

CA790/7924M4 Quad Async/Synchronous Channel Adapter • quad-port full-duplex asynchronous or synchronous channel adapter • same features as CA790/2A4 Dual Async or CA790/2S4 Dual Sync channel adapters • attaches directly to SM790/CN Controller Nest; does not require XN790 attachment:

1,100 11.00

CA790/7922E4 Dual Universal Channel Adapter • dual-port full-duplex channel adapter provides passthrough of SDLC or any bit-synchronous protocol in transparent fashion • requires card slot on XN790 Series I/O Expansion Nest; can also reside in Supermux 680 that is linked with the 790 Network Concentrator • requires software Revisions 4.5 or higher Mod I for 790 System Logic; 2.0 or higher for Expansion Nest Logic:

1,200 12.00

Neutral Current Interface • external adapter for 20-/60-mA devices • attaches to asynchronous channel port:

50 0.50

Polar Current Interface • external adapter for +/-60V, 60-mA

 ©1984 Data Decisions

Infotron Statistical Multiplexers, Network Concentrators & Processors
Supermux 380, 480, 600 Series & 680; 790/792NC & 990/992NP

devices • attaches to asynchronous channel port:

75	0.75

790/792ABR Automatic Baud Recognition • regulates asynchronous channel rate of dial-up line • selectable on individual channel basis • 110-, 134.5-, 150-, 300-, and 1200-bps rate • CR/Memorex convention • included in CA790 Async channel adapters:

NC	NC

790/792SCID Switching & Contention Intelligent Device • provides channel routing logic (see Channel Routing for details) • requires $600 installation charge • occupies single slot in 790/CNR Controller Nest:

7,500	75.00

CA790/7924E4 SDLC Pass-Through Channel Adapter • fits in 790/792NC Controller Nest or I/O Controller Expansion Nest • 38.4K-bps aggregate data rate • 1 adapter per 4 9600-bps channels or 2 19.2K-bps channels:

2,640	26.40

790/792 Channel Routing

All channels on units with Switching/Contention Logic **(option 790/SCID)** can be programmed as either switched or dedicated. Switched networks can be comprised of 790 and 792 Network Concentrators as well as Supermux 480 and 680 multiplexers equipped with switching/contention logic (see Supermux 480 and Supermux 680 for option pricing). Literally thousands of switched connections are possible, limited only by system/throughput constraints. Logical channel connections, or the type of connecting procedure for each channel, are selected through a supervisory operator console.

Programmable channel assignments include Keyboard Select Routing (KSR) channels, Auto Connect channels, and Dedicated channels. KSR and Auto Connect channels are available for **asynchronous devices only**. KSR channel users can select 1 of several destination channels, with or without contention. Auto Connect channels always connect to same destination channel while active; they can also contend with other channels for access to same port. When Auto Connect channels become inactive, the logical connection is broken, relinquishing link bandwidth to other active channels. Dedicated channels can be assigned to either asynchronous or synchronous devices; logical connections are permanently assigned to a single receiving channel, and link bandwidth is always available for a dedicated channel. Dedicated routing assignments and parameters can be changed via the supervisory port only.

Restricted Access Groups can be assigned to 790 Network Concentrator nodes, restricting access to sensitive resources to authorized users, and/or allowing users to contend for a group of channels instead of individual channels. Channels within a group can be called by other channels or can initiate calls; dedicated channels cannot access Restricted Access Groups. A channel within a group can be accessed by a group address, whereby any available channel services a call, or individual channels within a group can be called directly. Channels in Restricted Access Groups do not have to be contiguous.

790s with Switching/Contention can also provide EIA control signals for terminals that do not support them (control signal emulation), up to a maximum of 4 control signals per channel. This capability can be supported at either 1 or both ends of the connection. Existing control signals can also be **complemented**, again up to a maximum of 4 signals; dedicated users can thus be connected to dial-up ports, for instance.

Switching/Contention 790s can also support terminal-to-terminal or terminal-to-CPU communication at the same node. This application bypasses composite link communication; the 790 thus performs as a data PBX.

790/990 Composite Links

790/792CNR and 990/992CNR Controller Nests support up to 15 CL790/LM Series Link Modules • link rates of up to 9600, 19.2K, or 72K bps • SDLC and CCITT X.25 Level 2 protocol • CRC and ARQ error detection and correction • variable block length to 128 characters • EIA RS-232C/CCITT V.24/V.28/V.35 interface.

CL790/792LM480 Link Module • supports communications with remote Supermux 480 for up to 8 channels • link rate to 9600 bps • requires SM790/CN Controller Nest card slot:

$1,320 prch	$13.20 maint

CL790/792LM680 Link Module • supports communications with remote Supermux 680 for up to 32 channels • link rate to 9600 bps • requires SM790/CN Controller Nest card slot:

1,320	13.20

CL790/792LM780 Link Module • supports communications with remote Supermux 780 for up to 128 channels • link rate to 19.2K bps • requires SM790/CN Controller Nest card slot:

1,320	13.20

CL790/792LM790E Link Module • supports communications with remote 790 for up to 128 channels • link rate to 19.2K bps • requires SM790/CN Controller Nest card slot:

1,320	13.20

CL790/792LM790V Link Module • supports communications with remote 790 for up to 256 channels • link rate at 40.8/48/56/64K bps • requires 2 SM790/CN Controller Nest card slots:

2,200	22.00

CL790/792LM380 Link Module • supports communication with remote Supermux 380 • exchanges serial, full-duplex data at rates up to 14.4K bps • aggregate rate is 38.4K bps:

1,320	13.20

CL790/792LM600 Link Module • supports communication with remote Supermux 600 • 307.2K bps input aggregate on 32-channel SM632; 153.6K-bps aggregate rate on 16-channel SM632:

1,320	13.20

Remux • 2-channel inverse multiplexer implements traffic balancing for link modules • dynamically balances the traffic load between 2 points (nodes) over 2 links to increase throughput, and in the event of link failure automatically routes all traffic over the remaining link (at reduced throughput rates) to prevent loss of data • accommodates composite link rates at 9600/14.4K/19.2K bps, with per-channel (balanced) rates at 9600/7200/4800 bps • shuts down either link when more than 24 of the last 63 frames have been in error, halving the clock rate and transferring the entire data stream to the remaining good link • requires 2 4-wire unconditioned Type 3002 voice circuits and 4 modems • EIA RS-232C/CCITT V.24/V.28 electrical interface, all links • occupies any 2 adjacent slots of any Expansion Nest:

2,970	29.70

790/2400 Integral Modem • synchronous full-duplex 2400-bps integral modem for operation over 4-wire dedicated Type 3002 lines • AT&T 201C compatible; CCITT V.26B compatible • compromise equalization • occupies designated slot within 790 I/O Expansion Nest:

770	7.70

790/9600 Integral Modem • synchronous full-duplex 9600-/4800-bps integral modem for operation over unconditioned 4-wire dedicated Type 3002 lines • CCITT V.29/V.27 bis compatible • automatic adaptive equalization • occupies designated slot within 790 I/O Expansion Nest:

2,970	29.70

☐ 990/992 Network Processors

990/992 Central Control

System Rack or Controller Nest contains overall system logic, and supports channel adapters and composite link modules through various interface, nest, and link modules. System Rack provides room for redundant components. See 790/792 for pricing and details of additional power supplies and I/O Nest Interface Module.

990NP/SU 990 System Unit • a 72-inch floor cabinet with

 ©1984 Data Decisions

Infotron Statistical Multiplexers, Network Concentrators & Processors
Supermux 380, 480, 600 Series & 680; 790/792NC & 990/992NP

power status panel; contains a 990 Controller Nest (CNR) and 990 Rack Controller Nest Power Supply (CPR); includes space for redundant components and additional I/O nests:

$12,600 prch	$126.00 maint

990NP/RSU 990 Redundant System Unit • same as 990NP/SU but contains redundant 990/CPR power supply and redundant system logic:

24,400	244.00

992NP/SU 992 System Unit • standalone tabletop unit measuring 16.75 inches high by 17.59 inches wide by 18.75 inches deep • contains central logic, power supply, and 15 card slots:

9,800	98.00

992NP/RSU 992 Redundant System Unit • same as 992NP/SU but contains redundant 992/CPR power supply and redundant system logic:

19,400	194.00

Downline Load • automatically downline loads channel configuration parameters from master to slave unit • standard feature included in package price:

NC	NC

990/992 Flow Control

Flow control guards against buffer overflow resulting in loss of data; controls the flow of data from data terminal equipment at channel inputs by lowering or raising Clear-To-Send (CTS) on the EIA RS-232C channel interface or by generating XON/XOFF control characters • flow control performed on individual channel basis; different flow control techniques can be implemented for either end of each channel o flow suspension threshold established at 87.5 percent total buffer utilization; flow resumption threshold at 75 percent buffer utilization • also guards against buffer overflow at terminals resulting in loss of data; detects and responds to XON/XOFF flow control characters or interface signals from terminals by suspending/resuming data flow to channel outputs.

990/992 Diagnostic Tests

Diagnostic testing is conducted through a user-supplied ASCII CRT/keyboard console via keyed commands and displayed results • operator-selected tests are executed on a specific device and channel; results displayed on CRT screen; device specified as link module or channel adapter on local or remote concentrator throughout network • testing performed via menu-selected test procedures, test messages or patterns, and specified loopback paths • single-character or barber-pole test patterns to selected device/channel • loop/unloop specified device/channel • elapsed time measurement of transmission via selected device/channel loopback path • read/set control signal levels at specified device/channel • display loopback table presents all channels set to loopback.

990/992 Status Reporting/System Control

Operator-prompted system interaction through 1 to 4 user-supplied ASCII keyboard/CRT consoles; 1 or 2 central-site consoles; 1 or 2 remote channel-attached consoles • information presented and functions executed in response to keyed console commands; controls all 792s and compatible Supermux units in network • 5 function categories include system configuration; event reporting; performance statistics; diagnostics; and miscellaneous functions • system configuration mode displays and accepts changes to unit number/name; device parameters; and channel parameters; lists changes in change table with options to delete each change or establish on a temporary or permanent (enter in EPROM) basis • event reporting lists abnormal conditions including errors or failures and their location; and improper or critical conditions as they occur or when requested; events displayed for specific device or all system devices • performance status mode reports each statistic with time and location at 10-minute intervals; reports on specific devices or all devices in network • diagnostic mode executes operator-selected tests and displays results.

990/992 Advanced Network Manager

Consists of an IBM Personal Computer XT with proprietary software • an SDLC communication adapter communicates with the 990/992NP via an ANM-800 Link Module using a half-duplex synchronous format • ANM-800 menu options include a network monitor, alarm log, message center, reports, and diagnostics • ANM-800 is a powerful aid to users of large and/or complex networks • user can monitor connections, investigate node performance and generate report and status information • network monitor provides network topology maps which isolate nodal problems on a device level; separate submenus allow node insertion and deletion • operator can independently set alarm threshold on each device for maximum number of line errors and maximum round trip delay • Alarm Log maintains a chronological record of all alarm conditions reported from every device of every node in system • alarm conditions considered as line outage, buffer filled to 80 percent capacity, device initialization, total number of inbound and outbound errors, congested node, or deteriorated link • Message Center accommodates all operator-generated messages • reports generated provide 10-minute status displays • following report modes are supported: Device Statistics; Device Trend Chart; Statistics including Peak, Average, and Hour; Node Traffic Chart; Channel Statistics; Channel Trend Chart; and Diskette Directory.

990/992 Channels

990/992 Controller Nest supports up to 640 channels via up to 10 CL790/DIM Nest Interface Modules and associated XN790 I/O Expansion Nests; all parameters selectable via system operator console • asynchronous selectable rates of 50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2400, 4800, or 9600 bps; maximum aggregate input rate of 38.4K bps per Expansion Nest • synchronous selectable rates of 1200, 1800, 2000, 2400, 3600, 4800, 7200, or 9600 bps • 5, 6, 7, or 8 data bits; Baudot, ASCII, or IBM codes • RS-232C (standard) or 20-/60-mA loop interfaces • see 790/792 for pricing and details of I/O Expansion Nests and Channel Adapters.

BSC Emulation • supports IBM 3270 bisync environment • uses standard bisync channel interface adapter to emulate functions performed between bisync host and controller which lessens amount of bandwidth consumed by unproductive polls • consists of Controller Emulator and Host Emulator • Controller Emulator presents itself to 3270 Host Transmission Control Unit (TCU) which recognizes it as a 3271, 3274, 3275, or 3276 controller • Host Emulator, in turn, interfaces actual IBM 327X controller • standard 990/992 feature included in basic unit price.

Channel Routing

All channels on 990/992 units feature Tandem Switching/Alternate Reconfiguration (TSAR). TSAR supports all features associated with local switching and contention except map and trunk group configuration (refer to 790/792 Channel Routing section for complete capabilities). A firmware-implemented feature, TSAR automatically reroutes data traffic around faulty or congested nodes. With TSAR, the operator enters end-point parameters and all intermediate nodes are automatically configured. Tandem switching permits resource sharing by allowing Keyboard Select Routing (KSR) channels and Auto Connect (ACT) channels to contend for those resources in a global network that have distributed databases. However, it should be noted that TSAR functions aren't supported in a hybrid network containing 990NPs and 790NCs. The 990NP is reduced to 790 functionality when configured in a hybrid network and therefore doesn't support switching through 790 nodes.

Programmable channel assignments include **Permanent Physical Circuit (PPC)**, **Permanent Virtual Circuit (PVC)**, and **Temporary Virtual Circuit (TVC)**. PPC channels are dedicated nonswitched, nonreconfigurable circuits. These channels are established by the operator and cannot be modified by the configurator. PVC channels are synchronous or asynchronous channels with nonswitched paths established by the alternate routing capability at the various nodes. During initialization, PVC channels are routed from the caller to the specified destination over the fewest intervening nodes and over link modules with most available bandwidth. TVC channels are asynchronous

 ©1984 Data Decisions

Infotron Statistical Multiplexers, Network Concentrators & Processors
Supermux 380, 480, 600 Series & 680; 790/792NC & 990/992NP

channels with switched paths established by the tandem switching feature. When calls are placed, TVCs are routed over the path with the fewest number of intervening nodes and over link modules with the greatest available bandwidth. These paths are cancelled upon occurrence of a link failure.

990/992 Composite Link

990/992CNR Controller Nest supports up to 15 CL790/LM Series Link Modules • link rates of up to 9600, 19.2K, or 72K bps • SDLC and CCITT X.25 Level 2 protocol • CRC and ARQ error detection and correction • variable block length to 128 characters • EIA RS-232C/CCITT V.24/V.28/V.35 interface. See 790/792 for pricing and details on composite link modules.

• END

©1984 Data Decisions

Infotron Infostream 1500
T1 Multiplexer

■ PROFILE

Function • byte-interleaved TDM designed for T1 carrier facilities • point-to-point, drop-and-insert and multipoint applications; downline loading of remote multiplexer • handles asynchronous and synchronous data and voice (digitized) • composite link speed of 1.544M bps; uses bipolar NRZ encoding.

Communications/Networks • supports asynchronous data inputs at speeds from 50 bps to 19.2K bps; RS-232C interface • synchronous data input from 50 bps to 896K bps; RS-422 or CCITT V.35 interface • digitized voice employs PCM at 64K bps or ADPCM at 32K bps; 4-wire E&M interface • single composite link at 1.544M bps • D4Fe and DACS compatible framing • point-to-point, multipoint, drop-and-insert.

First Delivery • April 1985.

System Delivered • undisclosed.

Comparable Systems • Amdahl Model 2211, Avanti Ultra-Mux, Bayly Omniplexer, Coastcom D/I Mux, Codex 6240, Datatel DCP, DCA Netlink, General Data Comm Megamux Plus, Paradyne DCX-T1, Tellabs 430 TPlexer, and Timeplex Link/1.

Vendor • Infotron Systems Corporation; 9 North Olney Avenue, Cherry Hill, NJ 08003; 609-424-9400 or 800-257-8352.

Canadian Headquarters • Infotron Canada Ltd; 755 Queensway East, Unit 107, Mississauga, ON L4Y 4C5; 416-275-3888 or 800-268-2830.

Distribution • worldwide through direct sales forces and distributors.

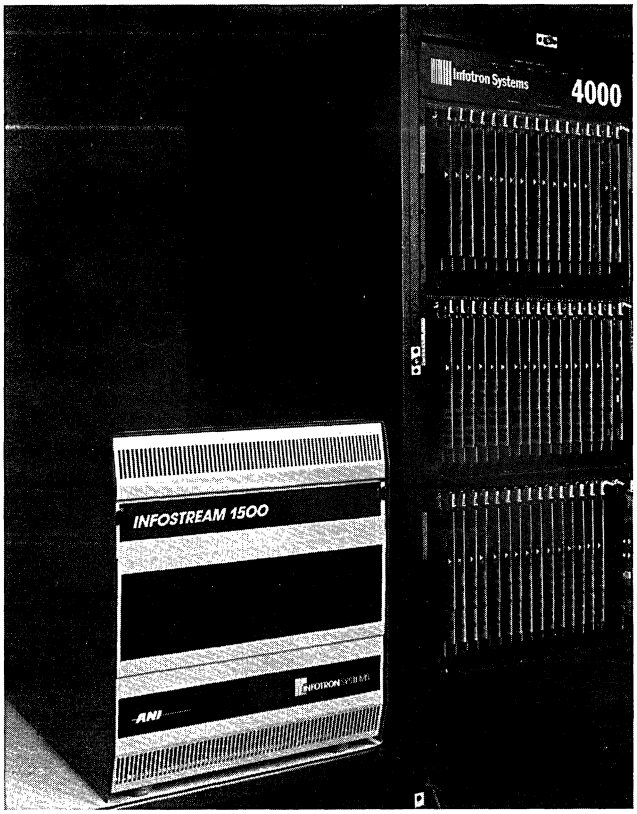
GSA Schedule • unlisted.

■ ANALYSIS

The Infostream 1500 is a byte-interleaved, time-division multiplexer designed specifically to combine a wide range of asynchronous, synchronous, and voice channels on a single broadband link referred to as a T1 carrier.

T1 carrier facilities have been used by the telephone company since the early 1960s to carry digitized voice and data. Until early 1983, however, T1 was unavailable as a tariffed service to private users. Those who required it had to subscribe to independent carriers or had to install their own microwave links. Users can now order the service under AT&T Communications Accunet T1.5 Service or Skynet T1.5 service.

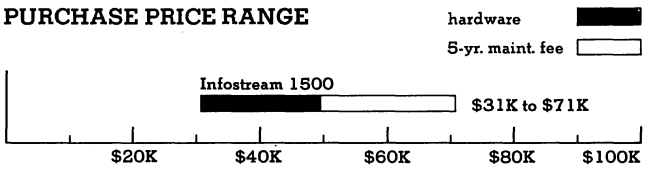
T1 offers the end user a high-volume communication facility at low cost. For example, a single 1.544M-bps link can support up to 24 64K-bps channels, and the transmission quality of the service is also superior. AT&T guarantees a point-to-point, full-duplex link with an error rate of no more than 1 bit in 1 million over a 1-day period.



The problem with operating on 64K-bps channel boundaries (called DSO) is that considerable bandwidth can be wasted if the channels are not efficiently "subslotted." For example, a multiplexer that services inputs based on subslotting multiples of 9600 bps will waste considerable bandwidth when lower-speed channels are being serviced. A 300-bps input into a 9600-bps subslot wastes 9300 bps. A good number of T1 multiplexers—including Infostream—do not operate on these 64K-bps channel boundaries, and assign bandwidth in accordance with the needs of the input device. Thus, considerably more channels can be accommodated. In the case of Infostream, up to 64 channels can currently be handled and 128 channels are projected.

Infostream can be configured to handle conventional TDM multiplexing applications whereby n-channels communicate with a like number of channels on a point-to-point basis; or the multiplexer can handle drop-and-insert applications. With drop-and-insert, certain channels originating at 1 multiplexer can be dropped at an intermediate multiplexer, while the remaining channels continue on to their ultimate destination. With data-insert channels, data can be inserted into the message train at the same

PURCHASE PRICE RANGE



INFOTRON INFOSTREAM PURCHASE PRICING bar graph covers price range between "small" and "large" configurations of hardware (solid bar) and associated 5-year maintenance fees (open bar) • **SMALL** configuration consists of basic unit containing single centered logic set and power supply, 16 data/voice channel card slots, 4 low-speed quad-port data channel cards, and 4 ADPCM quad-port voice channel cards • **LARGE** configuration consists of base unit with redundant control logic, power supplies, and 2 high-speed T1 links, plus 4 low-speed and 4 high-speed quad-port data channel cards, and 4 ADPCM quad-port voice channel cards. All prices are single-quantity purchase.

©1985 Data Decisions

Infotron Infostream 1500
T1 Multiplexer

intermediate multiplexer where data is dropped. Up to 8 locations, 6 being intermediate, can be configured in a drop-and-insert application.

Infostream is a very simple, compact system. A single chassis contains the control logic, I/O channel cards (asynchronous/synchronous data and voice), and power supply(s). The control logic employs 2 cards to handle all functions of system control, test, and monitoring, and these cards can be made redundant to ensure system operation should the primary system fail. Likewise, the power supply can be configured with a redundant load-sharing unit. Both the redundant logic and power will automatically switch over in the event of a failure.

Each of the channel cards contains 4 I/O ports. The low-speed card handles asynchronous and/or synchronous data channels, and allows intermixing of async/sync channels on the same card. A separate high-speed synchronous card is offered to accommodate data rates from 56K to 89.6K bps. Two voice cards are available, one employing Pulse Code Modulation (PCM) and the other Adaptive Differential Pulse Card Modulation (ADPCM) techniques for converting analog inputs to digitally-encoded outputs. Users can upgrade from PCM to ADPCM.

Infostream supports 2 data links which are used for drop-and-insert applications, and alternate path routing. The vendor claims that a multilink capability is under development, and recommends that those currently requiring this facility consider employing Infostream in conjunction with Infotron's IS 4000 data switch or the 990 network processor.

Infostream represents Infotron's second product in the T1 marketplace. Its first offering, called the T Mux, was an OEMed version of the Datatel DCP9100 and was a stop-gap product until the Infostream was developed. This new multiplexer is strictly an Infotron design.

Infotron certainly did its homework on this project. The system either now offers—or has in development—just about everything most users want in a T1 multiplexer. Features like total terminal control, drop-and-insert, direct asynchronous data handling as well as synchronous data and voice, D4Fe and DACS compatibility, and redundant control logic and power supplies are available now. Projected for introduction this year is a statistical multiplexer card, automatic reconfiguration based on time-of-day or event, multilink capability, and extended channel support. Currently, up to 64 channels are supported with an additional 64-channel expansion not projected. Many of these features an available on competitive products (e.g., Avanti-Ultra Mux, Codex 6240, Timeplex Link/1, General Datacomm's Megamux Plus, Datatel's DCP9100, and DCA's Netlink) but none offer all—at least as of this writing.

☐ Strengths

The strengths of this product are its flexibility in handling mixed data channels; the drop-and-insert facility; the redundant control logic/power supplies; the D4Fe framing and DACS compatibility; the security provided by the bypass-blocking operation; and its use of ADPCM for handling voice inputs.

Infostream employs a single card, called a low-speed data channel card, to handle asynchronous and synchronous data at speeds from 50 bps to 19.2K bps. The most obvious benefit from this approach is that separate data cards need not be purchased or stocked to accommodate different asynchronous and synchronous applications. The user merely programs the card from the terminal to change the operating mode. This single card concept should prove extremely valuable when Infotron releases the automatic reconfiguration based on time-of-day or event. Again, no card swapping is necessary to change operating modes. If there is a weakness in Infostream's "protean" card, it is the 19.2K-bps upper limit of the speed range. It's too low and necessitates the need for a separate high-speed data card (see Limitations).

The drop-and-insert facility allows users to designate specific data/voice channels originating at one multiplexer to be dropped at an intermediate multiplexer (another Infostream) while the remaining channels continue to their ultimate destination. At the intermediate site, other channels are inserted into the composite data stream and are demultiplexed at their specific destinations. Infostream performs drop-and-insert under software control, with channel assignments established at the supervisory terminals controlling each multiplexer in the network. Such control adds to the overall flexibility of the system by permitting the operator to change channel termination points throughout the network.

The redundant control logic and power supplies operate as hot spares and virtually guarantees uninterrupted service. In the event that a primary component fails, the backup automatically takes over to maintain communication. In addition, the 2 power supplies operate in tandem, sharing the overall power load. Thus, neither power supply is operating at full capacity, which should increase the life of both components.

The D4Fe framing-bit format, required for connection to Accunet T1.5, requires that the message frame have a specific bit density and pattern, and allow for the insertion of an 8K-byte AT&T-originated signaling/diagnostic pattern every 193rd bit position. Multiplexers not conforming to D4 framing are excluded from Accunet. In a drop-and-insert application, an intermediate node can fail due to an electrical or mechanical problem. When this happens, some means of recovery must be provided to bypass the failed node. Infostream does provide such a facility by bridging through the failed node, thus allowing data not slated to be dropped at it to continue to its ultimate destination via an alternate data link. During the bypass operation, all channels marked for dropping at the failed site are blocked, preventing them from passing through to the rest of the network. By blocking 3 channels, Infostream guarantees that sensitive data ticketed for the failed unit does not appear at an unauthorized site.

The alternate data link is employed in point-to-point applications as a means of providing a second link. Both links terminate at same end points, and both can be configured to broadcast simultaneously to provide a hot spare. The second link can also be a standby that is manually switched over. The hot spare approach appears to be the preferred method since it guarantees uninterrupted operation and eliminates the "ping-ponging" effect that occurs during a manual cold spare switchover. We want to emphasize that the second link is only a spare; it cannot be used as a second link to a different end point.

Another Infostream feature related to alternate-path routing is the channel-priority scheme. Essentially, this facility allows users to assign a numerical priority (up to 99 available) that is used to determine the order in which channels are assigned to the alternate link. Timeplex has a similar facility and DCA is working on it.

The use of ADPCM to handle analog-to-digital voice conversion conforms with AT&T's requirements for attaching to the Accunet service. Like PCM, ADPCM samples the analog voice signal 8,000 times a second but only sends a 4-bit change to represent a sample (PCM uses 8-bits). ADPCM therefore requires only 32K bps to handle voice, allowing 2 channels to share each 64K bps DSO time slot. For those wishing to attach modems to the voice channel, be advised that ADPCM will only pass up to 4800 bps before phase jitter problems occur. PCM will pass up to 9600 bps.

Also on the horizon for Infostream is the ability to overbook the high-speed link. In applications where devices are not permanently connected, they can contend for bandwidth by essentially raising an RTS signal. If sufficient bandwidth is available, they gain access. Contention is good for applications like RJE, where only a short transmit period is involved.

The final notable strength of Infostream is its Digital Access and Crossconnect Service (DACS) compatibility. DACS is a terminal-controlled system that allows the redistribution (switching) of individual DSO 64K-bps channels among T1 systems at a digital level. From a simple ASCII terminal, a user can direct a DACS controller to switch individual channels within a T1 stream to another T1 stream associated with the same DACS controller.

The DACS controller (AT&T calls it a "terminal") terminates up to 128 DS1 signals, one of which is used for control. The remaining 127 DS1 terminations (3,048 64K-bps channels) can be used for crossconnections. Since 2 DSO controller are required for a crossconnect, the DACS controller provides a maximum of 1,524 DSO crossconnections. DS1 signals to and from DACS are provided via DSX-1.

 ©1985 Data Decisions

Infotron Infostream 1500
T1 Multiplexer

DACS is compatible with DS1 formats found in D1D, D2, D3, and D4 channel banks, and is end-to-end compatible with general trade channel banks meeting the requirements of PUB 43801. For a T1 multiplexer to be DACS-compatible, **its channels must be DS0 (64K bps)** and its frame format must consist of 24 8-bit words and 1 superframe bit for a total of 193 bits. (A superframe is made up to 12 frames, and each superframe bit is timeshared to identify both channel framing and signal framing.) When the DACS services becomes available on a widespread basis, users will have one of the more powerful individual channel-switching facilities available on the commercial network.

☐ Limitations

The principal limitations involve the capabilities of the channel cards in handling synchronous data; the DTE/DCE interfaces swapping techniques; the lack of a bit error rate tester (BERT) on a per-channel basis; and its single-link restriction.

As mentioned under Strengths, a data card is offered that handles asynchronous and synchronous data, a significant user benefit. However, the upper limit on the synchronous range is 19.2K bps which is far too low for many applications. To accommodate speeds from 56K bps and up, a separate card called the high-speed channel adapter, is required. This unit, however, tops out at 896K bps which isn't bad, but it's too slow to handle high-resolution or full-motion video and large file transfers. (Both General Datacomm and DCA support synchronous transfer at over 1M bps. In fact, General Datacomm does it on the same channel card used to support 150 bps asynchronous data.) By splitting the synchronous speed ranges between cards, Infotron forces users to buy and spare separate cards. It could also diminish the effectiveness of its automatic reconfiguration scheme. The single-card concept used with General Datacomm's Megamux Plus feature Infotron should consider is the way DTE/DCE interface swapping is implemented. With Megamux, the DTE/DCE interface is reversed by merely removing an integrated circuit chip, reversing it, and reinserting it. With Infostream, cables must be swapped. While this chip-flipping is certainly easier than cable swapping, a much simpler and easier way for the user would be through the control terminal.

Infostream, currently, is a single-link point-to-point system. No provision is made for separately targeted links, like those needed for high-level distributed processing and communication applications. Infostream lags the Timeplex Link/1 which can be configured with up to 10 independent links, all controlled by the same central logic set. Infostream is even behind Avanti, Bayly, and Codex which supports multiple links but requires separate control logic and T1 drivers for each channel group targeted for different locations. As mentioned in the evaluation of those products, the association and restriction of channels using that technique makes control console reassignment of channels to different T1 links impossible.

Another Infostream limitation is the lack of link-speed range. Currently, the unit only runs at 1.544M bps which is the required speed for Accunet T1.5 and Skynet. However, no lower speeds such as those desirable for local networks are offered. Infotron states that lower speeds are under consideration.

■ HARDWARE

☐ Terms & Support

Terms • standard components and options are available on a purchase basis only • volume discounts are also available.

Support • all components carry a 1-year guarantee • product can be installed by the user or Infotron • 3 service plans are available—out-of-warranty factory service; on-call service; fixed-price service • fixed price on-call, on-site service performed during normal business hours 9:00 AM to 5:00 PM Monday through Friday, and is billed quarterly at 0.75 percent per month of equipment list price • telephone consulting and remote diagnostic services available.

☐ Overview

Infostream is a byte-interleaved, time division multiplexer (TDM) designed for point-to-point and multipoint communication over T1 carrier facilities. Cascaded multiplexers are supported, and the unit can be configured in a multinode network. Drop-and-insert and bypass applications are also supported. The Infostream time slot provides for an 8-bit byte to be transmitted or received, and the data-link format conforms to AT&T's Expanded Superframe Format (Fe) as well as DACS. The superframe format calls for frame consisting of 192 data bits plus 1 framing bit. Every fourth framing bit is used for link synchronization, and every other framing bit is used for link supervision operations such as maintenance, signaling, etc. In addition, every fourth framing bit is used for a 6-bit cyclic redundancy check (CRC), with the value of the CRC-6 bits determined by the preceding frame. CRC-6 is a very effective error-checking technique, guaranteed to detect 98.4 percent of errors within an Fe frame. The DACS format is described under Strengths.

Infostream's packaging is reasonably compact. Two cards handle all system functions such as channel configuring, system monitoring, testing, and multiplexing/demultiplexing. All central control logic, power supplies, and 16 quad-port channel cards are contained in a single chassis, with an optional expansion chassis for an additional 16 channel cards (64 I/O ports). The central control logic and power supply in the primary chassis also controls/powers the expansion unit. Infotron also allows the multiplexer to be configured with redundant control logic which automatically switches over, and load-sharing redundant power supplies. Units with redundant logic will accommodate 13 channel cards (52 channels).

The multiplexer is configured and controlled from a supervisory terminal, with all operations handled by menu-driven prompts. The supervisory port can be accessed locally through a direct connection or remotely via a modem. Security access is provided to guard against unauthorized users.

The multiplexer's channel cards accommodate asynchronous, synchronous, and voice channels. In addition, Infotron is also developing a statistical multiplexer channel card that accommodates up to four 9600-bps asynchronous channels on a single channel port for each card.

All Infostream channel cards contain 4 I/O ports; each port is individually configurable to the speed of the connected terminal. An asynchronous channel and low-speed synchronous channel accepts data rates from 50 bps to 19.2K bps, while the high-speed synchronous channel can be configured for speeds between 56K to 896K bps. Each low-speed channel contains a 24-bit buffer; channels can be configured as a DTE or DCE, allowing them to send or receive clock regrades. To change from DTE to DCE and the converse, cable swapping is required. Standard channel interfaces are RS-232C for asynchronous and CCITT V.35 or RS-422 for synchronous data.

The voice card also contains 4 ports and is offered in version employing pulse code modulation (PCM) or adaptive differential pulse code modulation (ADPCM). The PCM version employs conventional PCM sampling techniques and produces a digitized voice output at 64K bps; ADPCM outputs at 32K bps per channel. Both versions employ 4-wire E&M signaling and provide signaling for PBX-to-PBX applications. A kit is available which upgrades a PCM card to ADPCM.

Infostream can be configured with 2 composite links, which can be used for drop-and-insert, channel bypass, and/or alternate routing configurations. The latter is employed as a backup to the primary link and automatically activates should the primary fail. With drop-and-insert, uses can assign individual channels to be dropped at different locations (intermediate nodes) within the network, while channels destined for other locations bypass the drop sites. Currently up to 64 channels—and eventually 128 channels—can be handled in a drop-and-insert application. Up to 8 locations, 6 of which are intermediate sites, can be incorporated in a single Infostream application. When used with Infotron's IS 4000 Data Switch, up to 64 IS 4000 nodes can be integrated in an Infoswitch configuration.

Infostream implements drop-and-insert in software (no channel cabling) and does not employ back-to-back demultiplexing/multiplexing. users at intermediate sites can reassign dropped-

 ©1985 Data Decisions

Infotron Infostream 1500
T1 Multiplexer

channel time slots to channel data being inserted into the data stream at the dropped location. To employ drop-and-insert, the Infostream Dual-Link Base Unit (part 751442) must be used.

The multiplexer is configured and controlled completely from a supervisory terminal. When configuring individual channels, users can assign a priority designation which determines the order in which channels are assigned to the alternate communication link should the primary system fail. Higher-priority channels are rerouted before lower-priority ones. Up to 99 priority levels are assignable.

The node bypass scheme employed should provide maximum system integrity should an intermediate link in a drop-and-insert application fail. With node bypassing, all channels slated to be dropped at the failed node are **blocked** and the remainder of the channels bypass the failed unit via an alternate route and continue on to their ultimate destinations. The failed-node bypass is not to be confused with the channel bypass employed by Infostream with the previously described drop-and-insert operation.

☐ Infostream 1500

Central Control

751440 Infostream 1500 Base Unit Single Link • freestanding base unit nonredundant central logic, link interface, and power supply • provides 16 channel card slots (64-channel capacity) • supports single 1.544M bps link • includes 15-foot cable for connection to either AT&T 551A CSU or General Electric Gemlink microwave:

$7,400 prch	$55 maint

751441 Infostream 1500 Redundant Base Unit Single Link • same as 754401 except contains redundant control logic and accommodates 13 channel cards (52 channels):

12,400	93

751442 Infostream 1500 Base Unit Dual Link • same as 754410 except supports two 1.544M-bps T1 links and requires 2 link cables for connecting to the AT&T 551A CSU or GE Gemlink:

9,000	67

751443 Infostream 1500 Redundant Base Unit Dual Link • same as 751441 except supports two 1.544M-bps T1 links and requires 2 link cables for connecting to the AT&T 551A CSU or GE Gemlink:

15,600	117

172123 Infostream 1500 Dual Expansion Kit • upgrades single-link 751440 to dual-link 751442 • also upgrades the 172120 Central Logic Kit to dual link:

1,600	12

720157 Infostream 1500 Base Unit Power Supply • single power supply for base unit:

1,280	10

172120 Infostream 1500 Central Logic Kit, Single Link • spare central control logic unit for all versions of multiplexer:

4,720	35

PRCH: single-quantity purchase price. MAINT: monthly maintenance cost for on-site service. NA: not applicable. All prices current as of April 1985.

851042 Interface Cable • 15-foot cable used to connect T1 link to AT&T 551A CSU or General Electric Gemlink:

35	3

720166 Rackmount Adapter Kit • provides capability to mount Infostream 1500 in 19-inch cabinet:

80	6

720167 Rackmount Adapter Kit • provides capability to mount Infostream 1500 in 23-inch cabinet • front or center mount:

80	6

Channels

Infostream is offered with separate channel cards for handling asynchronous, synchronous, and voice channels. All cards provide 4 I/O ports, with each port individually configurable. The low-speed channel adapters handle mixed **asynchronous and synchronous** data at speeds from 50 bps to 19.2K bps. Only the RS-232C interface is available. Low-speed channels can also be clocked independent of network master. The high-speed channel adapter accommodates synchronous data at rates from 56K to 896K bps. This card is available with CCITT V.35 or RS-422 interfaces.

The voice channel cards are offered in versions which digitizes voice channels using either Pulse Card Modulation (PCM) or Adaptive Differential Pulse Code Modulation (ADPCM). A hit is available to change a PCM card to ADPCM. Both voice cards employ a 4-wire E&M signaling scheme. The voice cards also support signaling for PBX-to-PBX applications.

171356 Low-Speed Channel Adapter • provides channel logic for 4 individual asynchronous or synchronous data channels at speeds of 50 bps to 19.2K bps; 5, 6, 7, or 8 bits; and 1, 1.5, or 2 stop bits • passes up to 4 control signals (DTR, RTS, CTS, DSR, etc) • full-duplex • RS-232C interface • occupies single card slot:

$2,400 prch	$18 maint

172124 High-Speed Channel Adapter • provides channel logic for 4 individual synchronous channels at speeds from 56K to 896K bps • passes no control signals • full-duplex • RS-422 or CCITT V.35 interfaces • occupies single card slot:

2,400	18

170619 PCM Channel Adapter • provides channel logic for 4 individual voice channels • employs PCM quantization at 64K bps • 4-wire E&M signaling • supports signaling for PBX-to-PBX applications:

2,400	18

171357 ADPCM Channel Adapter • provides channel logic for 4 individual voice channels • employs ADPCM quantization at 32K bps • 4-wire E&M signaling • supports signaling for PBX-to-PBX applications:

3,400	25

170620 PCM-to-ADPCM Adapter • add-on module for PCM channel adapter (170619) providing upgrade to ADPCM channel capability (171357):

1,200	9

Composite Link

The standard Infostream unit contains a single composite link in a redundant version, a primary and secondary link can be established. The link between the Infostream and the AT&T T1 facilities is established via a customer-supplied CSU (AT&T 551A or equivalent); a link to GE's Gemlink digital microwave facility is also offered. Currently, only a data rate of 1.544M bps is supported on the T1 link.

• END

©1985 Data Decisions

Interactive Systems/3M VIDEODATA LAN/1
Broadband Packet-Switched Local Area Network

■ PROFILE

Architecture • VIDEODATA LAN/1 Local Area Network.

Type • broadband packet-switched network using coaxial cable bus topology to implement logical ring; see Figure 1 • uses token-passing access method implemented with the Datapoint RIM chip • provides virtual circuit service among devices connected to the cable.

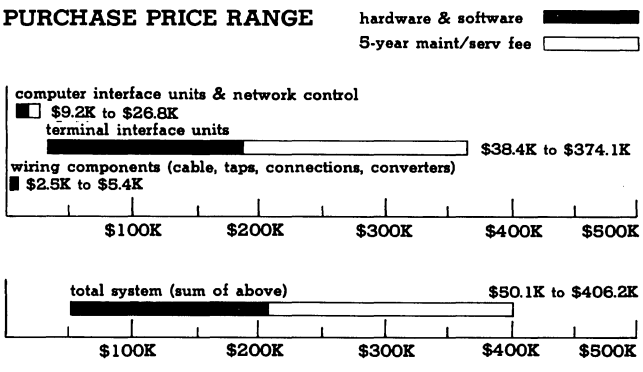
Transmission Speed • up to 2.5M-bps network data rate per channel; terminal data rate is 300 bps to 19.2K bps.

Cable Length • up to 14 miles end-to-end; tree structure can be arranged in 7-mile radius around head-end channel converter.

Applications • generic network that supports any vendor's hosts, any vendor's terminals, and any applications • operates as "information utility" for data processing, word processing, security systems, energy management, video training programs, production control, and electronic mail • Interactive Systems/3M has formed relationships with Allan Bradley and Diagnostic Imaging to provide internet connections to Allan Bradley's factory control networks and to Diagnostic Imaging standardized medical LAN; thus many LAN/1s will be used in industrial and medical applications.

Configuration • cable arranged in branching tree topology; includes 5 channels operating in the frequency range of 53.75 to 83.75 MHz for transmission and 246 to 276 MHz for reception with channel spacing of 6 MHz; head-end channel converter intercepts transmissions, converts devices interface to LAN/1 through 2/4/8-port Network Interface Unit (NIU); the optional Network Monitor Unit (NMU) operates as conventional user port as well as network monitor for system management; NMU consists of an IBM Personal Computer, 2-port NIU, and LAN/1 network monitoring software • up to 250 NIUs can connect to each of the 5 channels for a total of 1250 NIUs (10,000 users) per system • network cable is one-half inch in diameter with solid aluminum outer shield • NIUs are intelligent, thus LAN/1 does not require NMU for network operation.

PURCHASE PRICE RANGE



VIDEODATA LAN/1 PURCHASE PRICE • SMALL SYSTEM includes all basic components to interface 100 terminals and 2 computers to LAN/1 and all interconnecting units and cables; assumes 25% utilization of computer ports, 98% utilization of computer ports but less than 30% utilization of taps to connect either computers or terminals; includes 5 2-port NIUs, 9 4-port NIUs, 12 8-port NIUs, an NMU, 100 feet of network cable, a head-end converter, 16 20-foot drop cables, and 8 8-connection taps • **LARGE SYSTEM** includes all basic components to interface 500 terminals and 4 computers to LAN/1 and all interconnecting units and cables; assumes 25% utilization of computer ports, 99% utilization of terminal ports, but only 26% utilization of taps to connect either computers or terminals • includes 2 2-port NIUs, 9 4-port NIUs, 60 8-port NIUs, and 34 8-connection taps.

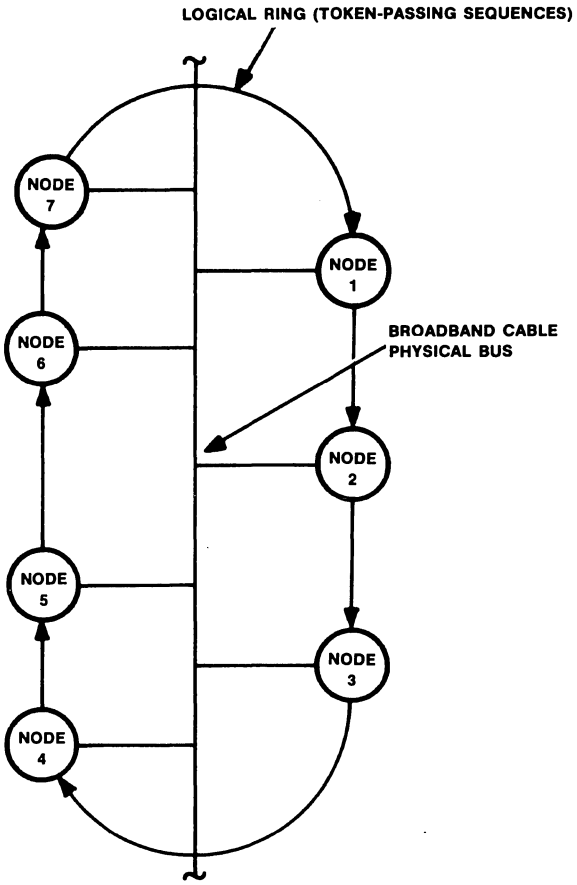


Figure 1 • VIDEODATA LAN/1 communication architecture.

Interface • 2/4/8-port Network Interface Unit (NIU) is a microprocessor-based intelligent Radio Frequency (RF) modem; includes 1 or more logic cards; uses Motorola 6809 microprocessor • RF modem is fixed frequency, thus all NIUs on a channel use the same transmission and receiver frequencies; the RF modem converts digital data to the required RF frequency on transmission and converts the RF signal from the cable to digital data at the receiver • logic cards format user data into packets for transmission on the network and implement the communication token-passing protocol • 2- and 4-port NIUs provide the RS-232C interface, 8-port NIUs provide RS-232C, RS-449C (RS-422) or CCITT V.35 interfaces for devices connected to the ports; currently, NIU supports only asynchronous serial connections to user devices; standard auto-baud data rates up to 9600 bps; user switch selectable to 19.2K bps.

Gateways • planned X.25 connections, Diagnostic Imaging standard LAN for medical applications, and a gateway to 802.4

 ©1984 Data Decisions

Interactive Systems/3M VIDEODATA LAN/1
Broadband Packet-Switched Local Area Network

network that is currently under development (will be called LAN II).

Support of Foreign Devices • none currently; network is generic with standard interfaces • Network Monitor Unit (NMU) software programmed in "C" language, thus any computer that supports C can be used as NMU; user can communicate with system using any ASCII terminal.

Communications Management • distributed intelligence in Network Interface Units (NIUs) which implement communication protocols and provide for communicating with user; system automatically reconfigures if NIU fails or if new NIU comes online • optional Network Monitor Unit (NMU) provides for system maintenance and management; can collect and display network statistics and exercise special network control.

Protocols • token-passing access method • used for sharing a channel • implemented using the Datapoint RIM chip; on LAN/1 the RIM (resource interface module) is called a TAC (token access controller).

Support Software • provides console mode and data mode support to terminal devices at each port on an NIU through Main Menu/Console Mode Menu (when device is powered-up) or configuration menu to establish local or remote port parameters; each NIU port keeps statistics on its operation; operator on local port can access and display statistics on any network port; system parameters can include a password to prevent access by unauthorized personnel • Network Monitor Unit (NMU) is special NIU with hardwired address #1; special software handles NMU data communication for monitoring, maintaining, and managing network.

Distributed Functions • network control and statistics at each NIU; can be collected at central site by NMU • application functions reside in user devices and software; not part of LAN/1.

First Delivery • September 1983.

Number Delivered • over 50; over 350 predecessor VIDEODATA LANs.

Comparable Systems • Concord Data Systems Token/Net is also broadband CATV-based generic LAN, but uses the IEEE-802.4 recommended standard for token-passing network access rather than the Datapoint RIM protocol; Token/Net also provides 5 channels spaced 6 MHz apart; each channel operates at 5M bps as compared with 2.5M bps on LAN/1; uses frequency agile RF modems, thus the Token/Net Interface Module (TIM, which compares to the LAN/1 NIU) can interface to all 5 channels; the NIU includes fixed-frequency RF modem and can interface to only 1 channel • Datapoint ARCnet uses same access protocol but is a single-channel baseband system; it uses the same 2.5M-bps data rate; also, Datapoint is a distributed processor vendor, providing data processing hardware and software interconnected through ARCnet; software support is Datapoint oriented; Interactive Systems/3M is an RF modem vendor; software support is for generic network interconnecting any vendor's equipment • other broadband generic networks include such LANs as the Contel ContelNet, Sytek Local Net 20/40, and Ungermann-Bass Net/One.

Vendor • Interactive Systems Division of 3M; P.O. Box 33600, St. Paul, MN 55133; 612-733-9817 • also 3920 Varsity Drive, Ann Arbor, MI; 313-973-1600.

Distribution • through 3M National Service Centers.

■ ANALYSIS

Interactive Systems was founded in 1969 to market minicomputer-based monitoring, testing, and control systems. The company became a systems integrator for Hewlett-Packard equipment. Early in 1972, the company became involved in broadband local area networks, linking over 100 video, voice, and data terminals for reliability testing at automobile factories. The first Videodata system was installed in 1974, with the first mid-split 300-MHz broadband Videodata system installed in 1975. The 3M Corporation acquired Interactive Systems in 1979, and the company became the Interactive System Division of 3M, which has now installed over 300 Videodata systems.

Although broadband, the first VIDEODATA LAN was designed in a controller-based polled environment to effect channel sharing through time division multiplexing (TDM). As distributed processing became common, many multipurpose terminals needed to access multiple hosts, switching access from host to host depending on the application. This environment requires a network with enough distributed intelligence at the nodes to run the network without a central controller.

VIDEODATA LAN/1 was designed to operate without a central controller. The Network Interface Units are microprocessor-based, and each NIU can control its own network communications as well as perform its share of the network housekeeping tasks and keep local port statistics. The optional Network Monitor Unit (NMU) provides a central site to store and access network statistics and to perform network diagnostics. The same functions performed by NMU can be performed at any NIU, but not as easily. Eventually, NMU will probably be used to provide special network services although the current implementation does not do so.

VIDEODATA LAN/1 uses the Datapoint RIM chip which implements a token-passing access protocol. The system has been proven in over 5,000 Datapoint ARCnet installations, and Datapoint has voluminous data on its performance. Unlike CSMA/CD, this protocol provides guaranteed message delivery; CSMA/CD provides a best efforts Datagram service.

Before transmitting, a node sends a Free Buffer Enquiry (FBE) to the destination node to determine if it has buffer space to receive a message. The destination node returns an ACK if it has free buffer space and a NAK if it does not. The source node sends the message only if it receives an "ACK." After the message is sent, the source waits for an ACK for a time-out interval before sending the token to the next node in the network. If a message ACK is not received, the source assumes a NAK and attempts to transmit the message again the next time it receives the token.

The CSMA/CD protocol used in Ethernet provides no positive acknowledgement of a message. A source node sends its message as soon as it gains access to the channel. If there is no collision during its transmission, the source node assumes the message was received. Positive acknowledgement requires implementation through higher level protocols.

The LAN/1 token-passing scheme requires reconfiguration only when the token is lost or a new NIU comes online. An NIU going off-line does not require reconfiguration. Also, a source node never tries to pass the token to an NIU that is off-line except during reconfiguration.

This procedure shortens the time for token passing to that required for the online NIUs.

Interactive Systems/3M is developing LAN II, which is based on the IEEE 802.4 token bus standard. It will be in field test in late 1984 with a commercial product available in mid-1985. LAN II will be used primarily for industrial applications. The data transmission rate over LAN II will be 10M bps.

A company spokesman stated that the company will continue to sell and support LAN I after LAN II is available.

□ Strengths

VIDEODATA LAN/1 is a generic LAN, thus it can be used to interconnect equipment from multiple vendors. LAN/1 uses a proven token-passing access protocol that allows users to predict maximum access time for transmission of messages. LAN/1 is a broadband network that can combine video, voice, and data to satisfy user requirements.

LAN/1 uses only 60 MHz (20%) of the total 300-MHz bandwidth, thus the same cable can be used for other applications as they are added.

Finally, Interactive Systems/3M are experienced vendors of broadband networks. They have installed over 300 of them over the past 10 years.

□ Limitations

Interactive Systems/3M uses fixed-frequency RF modems to

 ©1984 Data Decisions

Interactive Systems/3M VIDEODATA LAN/1
Broadband Packet-Switched Local Area Network

interface the cable, thus each Network Interface Unit (NIU) can connect to only 1 LAN/1 channel. Bridges will need to be developed to allow intercommunication among channels. So far, such bridges are unavailable.

The question appears to be whether frequency-agile RF modems, used by Wang and Concord Data Systems, are as reliable as fixed frequency RF modems. Concord Data Systems claims they are, while Interactive Systems/3M claims they are not. Interactive Systems/3M claims the error rate on LAN/1 is one in a billion.

The data rate on each LAN/1 channel is 2.5M bps which is high enough so that many applications will require only 1 channel thus they require no cross-channel bridges. The ARCnet baseband network has only 1 2.5M-bps channel, for example. The data rate on MIRLAN, the baseband network under development by NCR and Intel, is only 1M bps. Thus, the requirement for interchannel bridges is not a serious limitation.

■ NETWORK SUMMARY

VIDEODATA LAN/1 is a high-speed broadband local area network designed to interconnect terminals with multiple host computers in commercial, industrial, government, medical, and education applications. The Interactive Systems/3M customer base for VIDEODATA networks (predecessor to LAN/1) includes manufacturers (60%), government agencies (18%), education institutions (9%), banks (7%), research groups (3%), and medical groups (2%). Currently, customers for LAN/1 are users of VIDEODATA networks needing more flexibility than it provides. The older time-multiplexed VIDEODATA systems can reside amicably on the cable with LAN/1 devices because they operate in different frequency ranges.

Interactive Systems/3M has formed a relationship with Allan Bradley and Western Digital to develop a broadband 10M-bps network using the IEEE 802.4 recommendation for token-passing network access. This network should be in field test in 1984 and a commercial product in mid-1985. It is for the industrial environment. They also have a relationship with Diagnostic Imaging for bridging to a medical network of electronic diagnostic devices. This is a separate long-range development effort.

The VIDEODATA LAN/1 provides the user with the advantages inherent in well-designed local area networks: transparent to connected devices, an efficient shared environment, flexible (applications/topology/configurations), reliable, secure (data encryption), easy maintenance, and low cost. Transmission between devices is supported over 5 broadband channels that provide a maximum aggregate data rate of 2.5M bps for each channel. Access to the channel is through a token-passing protocol based on the Datapoint RIM chip. The chip is model COM9026 from Standard Microsystems Corporation of Hauppauge, New York.

The LAN/1 components consist of standard CATV cable and connectors, RF modems, Network Interface Units (NIUs), and Network Monitor Units (NMUs).

The coaxial cable operates over the 5M- to 300-MHz range with a midsplit CATV frequency configuration. Maximum cable length can range to 14 miles end-to-end, strung in a 7-mile radius around the head-end converter. Low-cost, standard 75-ohm taps connect the RF modems to the cable. Taps must be located so that the RG-6 coaxial drop cables to connect devices are between 50 to 100 feet long. All unused taps must be capped with 75-ohm terminations to eliminate reflections and noise pickup.

Transmission frequencies are in the range of 50M to 80 MHz, converted at the head end to the receiver frequencies in the 250M- to 280-MHz range. Amplifiers which operate across all channels must be located every 2,000 feet.

The RF modems are fixed-frequency units tuned to interface one of the 5 channels. Devices that can provide the LAN/1 token-passing protocol can interface to LAN/1 through an RF modem. Generally, devices interface to the network cable through an NIU, which includes an RF modem as well as the protocol processor based on the Motorola 6809.

NIUs are available in 2-port, 4-port, and 8-port versions; see Figure 2. The 2-/4-port versions provide RS-232C interfaces to user devices, the 8-port version provides RS-232C, RS-449C (RS-422), or CCITT V.35 interfaces. An NIU can communicate over only 1 of the LAN/1 channels.

The NMU includes a special NIU that interfaces an IBM Personal Computer, which can function as a terminal on the network as well as the NMU. The processing associated with the NMU requires only about 20% of the PC's capacity. The NMU software is programmed in the "C" language and can run on any computer supporting that language. Only about 10 lines of code are written in assembly language.

Each NIU can operate in console or data mode. In console mode, it can be used for control functions through a command language. In data mode, it can transmit messages to other NIUs on the network.

The command language provides for configuring local/remote port, calling/disconnecting remote port, returning to data mode, sending test messages, displaying/clearing statistics, displaying or clearing main menu, changing password, and displaying/editing name table (alphanumeric 19-character names up to 10 ports keyed to port numbers).

The NMU includes a special 2-port NIU hardwired to address 1 and special software to handle NMU data communication. Port 2 of NMU is connected to port 1 of the NIU and port 1 of NMU is connected to a conventional voice-grade modem, which communicates with a remote CRT display over a telephone line. The NMU also contains supervisory and interface software to monitor network, read and record virtual circuits in effect, diagnostic functions on all NIUs, broadcast maintenance message packets, configure remote NIU port parameters, and operate as a user port.

LAN/1 provides virtual circuit service. Connections between nodes (NIUs) on the network are established, disconnected, and redefined using commands and addressable logic in the NIUs. The system uses no dedicated connections between nodes.

■ SOFTWARE

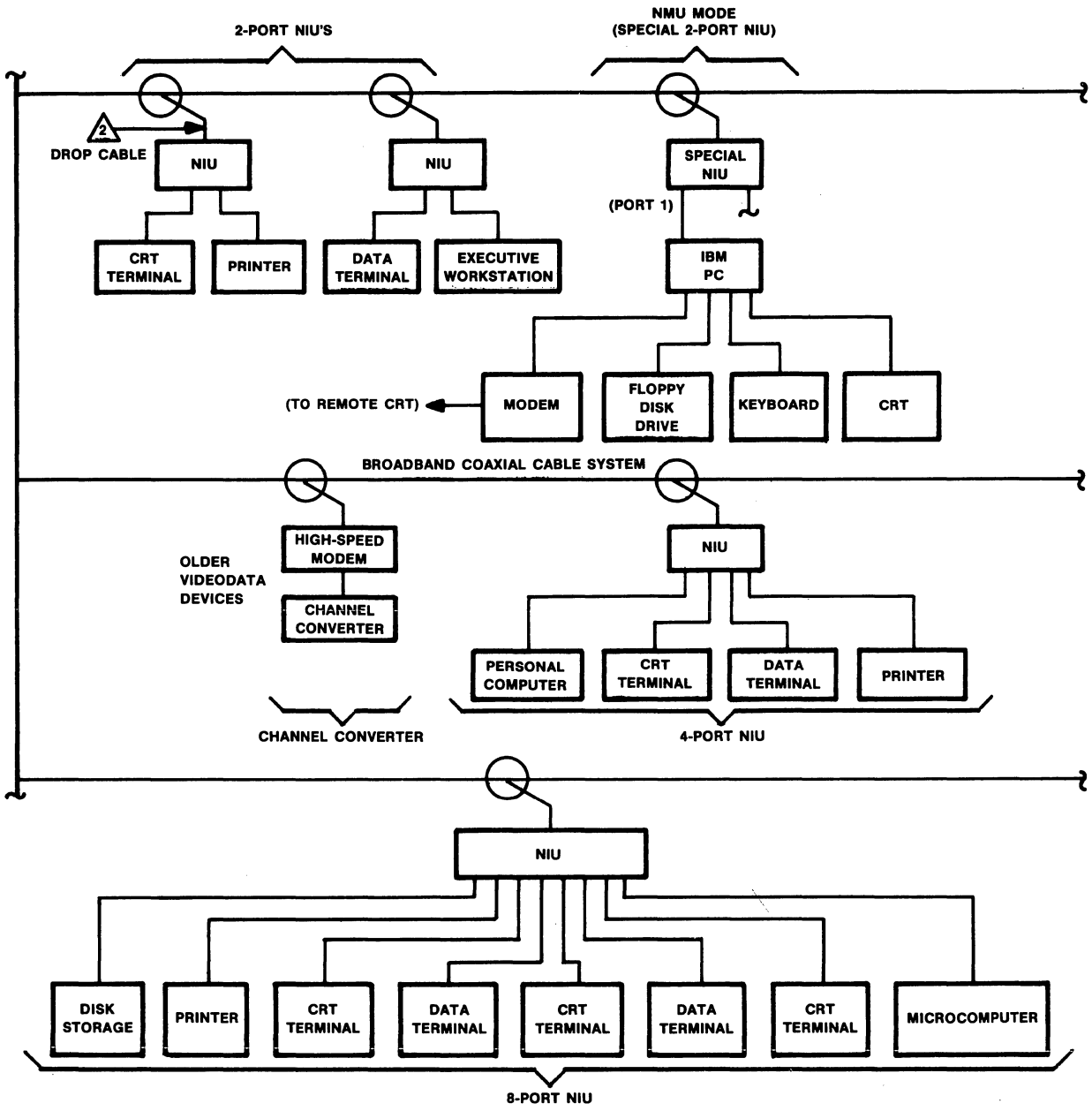
Interactive Systems/3M provides the software to control the Network Interface Unit (NIU) with the system. The Network Monitor Unit (NMU) software is not sold separately, but is included in the NMU package.

NIU Software • when powered-up, NIU puts the terminal device in console mode with either the main menu or a prompt on the screen; the user can enter any of 12 commands • commands are Configure Local Port, Configure Remote Port, Call Remote Port, Disconnect, Return to Data Mode, Send N ASCII Fox messages (to test circuit), Display Statistics, Clear Statistics, Menu OFF, Menu ON, Change Password, and Display-edit Name Table • 19 configuration parameters are provided selecting data rate, character length, XON/XOFF flow control, RTS/CTS flow control, auto-baud, etc • local port statistics include number of network reconfigurations, propagation delay to cable head end (in microseconds), buffer allocation, total packets sent, number of information packets sent, total packets received, number of information packets received, number of packets resent because of link failures, and number of times characters were last due to serial port overflow on input • display-edit name table command displays a 10-line Address-Name Table which the user can fill with node addresses followed by 19-character names; once the table is established, the user can call the remote node by its name rather than its address • any number of ports on an NIU can form a single contention group; each port has its own contention enable/disable setting to govern its participation in the port contention group.

NMU Software • written in the "C" language for the IBM Personal Computer; runs on other systems that support the C language; only 10 lines of code are written in the IBM PC assembler language • runs in Terminal or Monitor Mode; in Terminal Mode, operates as any other terminal on LAN/1; in Monitor Mode, operates as network monitor • Monitor Mode runs 2 tasks concurrently: Data Collection collects information from all NIUs on the network at regular intervals and Data Display processes the information and displays it on the IBM PC • Monitor Mode Command language allows operator to set scan interval, scan after reconfiguration, and scan response time; to

 ©1984 Data Decisions

Interactive Systems/3M VIDEODATA LAN/1
Broadband Packet-Switched Local Area Network



1 SYMBOL FOR COAXIAL TAP.

2 DROP CABLES ARE LOW-CAPACITANCE RG-6 FLEXIBLE COAXIAL CABLE, 100 FEET LONG, MAXIMUM.

Figure 2 • LAN/1 nodes with 2-, 4-, and 8-port NIUs and typical network devices.

initiate/stop data collection; to enable/disable node, reset statistics, begin data collection, exit to data display task, or to develop and change parameters.

■ HARDWARE

□ Terms & Support

Terms • hardware available for purchase only.

Support • maintenance is available through 3M National Service Centers under an on-site guaranteed 4-hour maintenance plan; per month maintenance fee is 1.5% of total purchase price of NIUs, modems, amplifiers, channel converter, and NMU; excludes purchase price of cables, taps, splitters, and connectors • main service for site studies, planning, and network design through Interactive Systems/3M main plant in Ann Arbor, Michigan.

©1984 Data Decisions

Interactive Systems/3M VIDEODATA LAN/1
Broadband Packet-Switched Local Area Network

Network Interface Units (NIUs)

Available in 2-port, 4-port, and 8-port models, NIU includes a fixed-frequency RF modem and a Motorola 6809 protocol processor. The protocol processor implements the token-passing access scheme and the communication procedures.

The RF modem interfaces the NIU to the LAN/1 cable. Ports on the NIU provide interfacing to user devices.

2-Port NIU • provides 2 RS-232C ports:
$1,400.00 prch

4-Port NIU • provides 4 RS-232C ports:
2,100.00

8-Port NIU • provides 8 RS-232C, RS-449C (RS-422), or CCITT V.35 ports:
3,200.00

Network Monitor Unit (NMU) • includes special version of a 2-port NIU and the NMU software that runs on an IBM PC; see Figure 3 • the user can supply own IBM PC or other system that runs the "C" language:
5,700.00

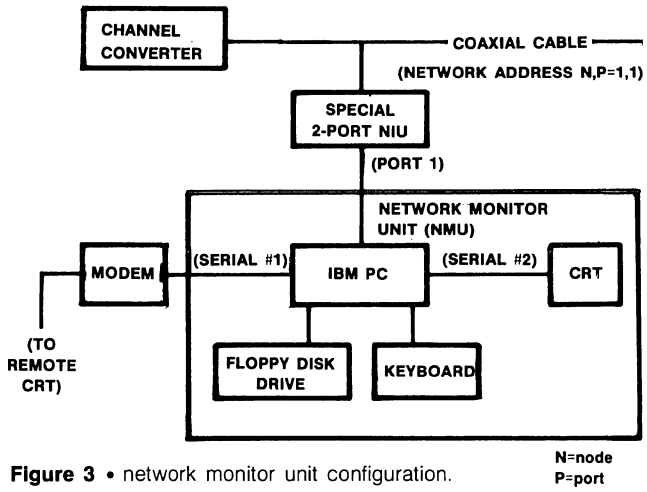


Figure 3 • network monitor unit configuration.

Channel Converter • converts all 5 channels from transmit frequency to receive frequency; offset is 192.25 MHz; channels are spaced at 6 MHz ranging from 53.75 MHz to 83.75 MHz for transmit and 246 to 276 MHz for receive:
2,285.00

Network Components

Components are standard CATV cables, taps, connectors, and amplifiers.

Network Cable • half-inch coaxial cable with protective aluminum shield; 75-ohm impedance; per foot:
$0.30 prch

Drop Cable • standard RG-6 coaxial cable; per foot:
0.30

2-Connection Tap:
8.00

4-Connection Tap:
13.00

8-Connection Tap:
16.00

Couplers • connects 2 main cables together:
50.00

2-Way Splitter • connects to a tap:
2.00

4-Way Splitter • connects to a tap:
5.00

8-Way Splitter • connects to a tap:
5.00

Amplifier • amplifies signals on main cable; depending on number of taps on cable, required every 1,500 to 2,500 feet; price varies according to manufacturer and specifications:
$1,500 to $1,900.00 prch

■ SPECIFICATION

VIDEODATA LAN/1 uses Datapoint's token-passing protocol. Chips to implement it are available from Standard Microsystem Corporation, 35 Marcus Boulevard, Hauppauge, NY 11788. The specification is available from Datapoint without charge.

Packet Format

The protocol includes 5 types of messages: Invitation-to-Transmit Free Buffer Inquiry, Packet, Acknowledgement (ACK), and Negative Acknowledgement. See Figure 4. Messages can range from 1 to 260 bytes long.

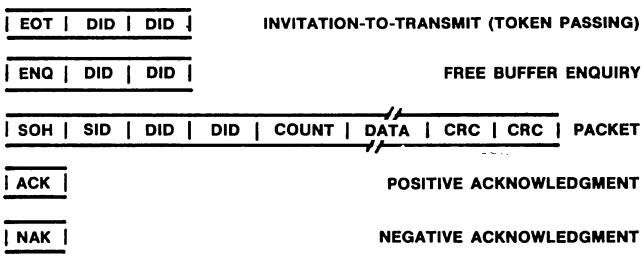


Figure 4 • packet message formats.

The line idles in a no-signal condition (spacing). Each message begins with an alert burst composed of 6 unit intervals of the mark signal. A mark is a 200-nanosecond wide dipulse: a 100-nanosecond positive pulse followed by a 100-nanosecond negative pulse. The 6-unit mark is then followed by the bytes in a message. Each byte, however, is preceded by a 2-unit interval of the mark signal and a space. Thus, each byte transmitted consists of 11 bits.

Invitation-to-Transmit • consists of Alert Burst followed by 3 characters: ASCII EOT (End of Transmission) characters and 2 Destination Identification (DID) characters • used to pass token from NIU to NIU.

Free Buffer Enquiry • consists of an Alert Burst followed by 3 characters; ASCII ENQ (Enquiry) and 2 Destination Identification (DID) characters • requests to receive a packet.

Packet • consists of Alert Burst followed by ASCII SOH (Start of Header) character, 1 Source Identification (SID) character, 2 Destination Identification (DID) characters (count number of data bytes in message), 1 to 253 bytes of data, and 2 CRC (Cyclic Redundancy Check) characters • used to transmit data between RIMs.

Acknowledgment • consists of an Alert Burst followed by ASCII ACK (Acknowledgment) character • acknowledges packet reception and is a positive response to Free Buffer Enquiry.

PRCH: purchase price; some items such as cable are charged by foot; amplifiers available in a range of prices. Prices effective as of July 1984.

©1984 Data Decisions

Interactive Systems/3M VIDEODATA LAN/1
Broadband Packet-Switched Local Area Network

Negative Acknowledgment • consists of an Alert Burst followed by ASCII NAK (Negative Acknowledgment) character • negative response to Free Buffer Enquiry • non-valid data messages are not NAKed, they are merely ignored.

The NIU receiver validates all messages by checking that at least 1 mark and a space precede each character, that a proper ASCII character follows the Alert Burst (EOT, ENQ, SOH, ACK, NAK), that CRC is correct, that message contains the proper number of characters (1, 3, or 8 to 260), and that at least 9 spaces follow the last character.

Transmission Characteristics

Channel Encoding • uses a 200-nanosecond dipulse as a mark; 100-nanosecond positive pulse followed by 100-nanosecond negative pulse • a space transmits no energy thus there is virtually no intersymbol interference. All messages are preceded by an alert signal which consists of 6 marks. All bytes (characters or information) are preceded by 2 marks and a space.

Data Rate • 2.5M bps or 400 nanoseconds per bit • system throughput is a function of the number of active NIUs (nodes) on the network, the number of NIUs that have messages to pass each time the token passes, the length of the messages transmitted (the protocol passes tokens only to active nodes), and the length of the cable • a simple token pass requires 28 microseconds; a message takes 113 microseconds plus 4.4 microseconds per byte of data; thus a message followed by a token pass requires 141 microseconds plus 4.4 microseconds per byte of data transmitted • total time required for a token to circulate the network is 28 microseconds per active node (for token pass) plus 113 microseconds per message (waiting to be sent) plus 4.4 microseconds per message byte plus propagada delay.

Carrier • generated by presence of activity on cable; idle state generates no carrier signal on line.

Topology • physical bus but logical ring, organized in branching tree topology; logical ring formed for network addressing • node addresses are 1 through 255; each node initializes to address of node with next higher address; address "0" broadcasts messages to all nodes; addressing is independent of physical location on bus • each node must be able to sense all other nodes and there must be only 1 path between 2 nodes • timing considerations limits end-to-end cable length to about 14 miles • distance between amplifiers is limited to about 2,000 feet.

Control Procedures

Control procedures follow the token-passing scheme to control accesses to the channel from the up to 255 NIUs (nodes) that can be connected to the cable. Only 1 station can transmit at a time, thus before transmission, a station must determine if the channel is free. This is performed by the station by waiting until it receives an "Invitation-to-Transmit" message containing its address. This is the token-passing message.

If the addressed station has a message to transmit, it first sends an Enquiry to the station that is to receive its message, asking if it has free buffer space available. if the receiving station does have free buffer space, it replies with an "ACK" message. If it has no buffer space available, the receiving station returns a "NAK" message.

When the station that has control of the line (the token) receives an "ACK," it immediately sends its message to the appropriate station and waits for an "ACK" message, indicating the transmission was successfully received. The station then sends an Invitation-to-Transmit to the node with the next address (NID of next active node) higher that its own.

The station that has control of the line (the token) can receive a "NAK" in response to its Enquiry of the station that is to receive the message (packet) meaning the station has no free buffer space. When this happens, the sending station retains the message (packet) until the token is next passed around the network; then it tries to send the packet again.

If the packet when it arrives at the receiving station is in error—fails CRC test, number of bytes in message, number of marks and spaces between characters, and so on—the receiving station ignores it. When the sending station does not receive an ACK in response to its packet, the sending station retains the packet until the token is passed around again. Then it transmits the packet again. The sending station waits up to 74 microseconds for an ACK before it passes the token to the next node.

If a station that has the token wishes to broadcast a message, it uses address "O." If does not send out an Enquiry prior to the message but simply sends the message. Each node set to receive broadcast messages write the message in its receive buffer. Broadcast messages are not ACKed.

The next address (NID) for token passing is not necessarily only 1 higher than that of the station passing the token. It is the address of the last node to which the station passed the token. If a station passing the token does not hear activity on the line within 74 microseconds after sending the Invitation-to-Transmit, the station increases its NID counter by 1 and passes the token again. This continues until the token is passed to an active node. This arrangement allows nodes to go off-line without requiring a system reconfiguration and increases line efficiency by not passing tokens to inactive nodes. This arrangement also means that nodes must explicitly register as being online. When the token is lost or a node comes online, the system must be reconfigured.

The token is assumed lost when a node has not received an Invitation-to-Transmit for 840 milliseconds. It will also occur to a node coming online. The node sends a Reconfigure Burst, consisting of 8 marks and 1 space, repeated 765 times, to terminate all line activity. This occurs because any NIU sending the Invitation-to-Transmit hears line activity and releases control of the line. The NIU being addressed cannot hear its address and cannot pick up control of the line.

When an NIU observes that the line has been idle for 78 microseconds, it assumes the system is being reconfigured. The NIU clears its NID counter to its own address (ID) and begins a time-out equal to 146 (255- its ID) microseconds. When the time-out ends, (for the highest numbered ID), the NIU starts sending out an Invitation-to-Transmit to itself. After hearing no response, it increments NID and tries again. This continues until it addresses the next active NIU (NID) and this is the address it retains until the next system reconfiguration or the addressed NIU goes off-line.

During system reconfiguration, the token is passed to each possible node address including "0" thus, the NIDs stored in the NIU after reconfiguration include only the addresses of nodes currently active.

Token Passing • Invitation-to-Transmit message to NID (next active node); node receiving message has token and is free to transmit.

Enquiry • before transmission, sending station insures that receiving station has buffer space to receive packet of data • receiving station returns ACK or NAK response; sending station waits for its next turn for transmission if it receives NAK.

Packet Transmission • after receiving an ACK, meaning buffer space available, sending station transmits data packet • if packet received without error, receiving station returns ACK response; if packet received with error, receiving station ignores it • sending station waits for its next turn to retransmit packet.

Broadcast Transmission • skip Enquiry and transmit message with address "0" and all nodes set to receive broadcast messages write it in their buffers; never ACKed by receiving nodes.

System Reconfiguration • when token is lost new node comes online; establishes token-passing sequence for all active nodes on the network • occurs when node has not received token for 840 milliseconds, meaning token is lost or node has just been switched online.

Transmission Medium

VIDEODATA LAN/1 uses low capacitance standard 75-ohm CATV cable. Taps to the cable have 2, 4, or 8 ports. Drop cables between the tap and an NIU can be up to 100 feet long.

©1984 Data Decisions

Interactive Systems/3M VIDEODATA LAN/1
Broadband Packet-Switched Local Area Network

Use

VIDEODATA LAN/1 will be used in the same environments as the older VIDEODATA system: industrial, medical, government, research, education, and banking. Initially, LAN/1 will be superimposed on the same cable as VIDEODATA systems.

• END

©1984 Data Decisions

ITT Courier 270 Series
Information Display System

■ PROFILE

Function • clustered display-terminal system for inquiry/update, data entry, interactive program development, and report generation • all processing and database services performed by the host • emulates IBM 3271/3272/3274/3276 cluster controllers; 3178, 3277, 3278, and 3279 display terminals; and 3287/3262 printers.

Architectures Supported • used with IBM S/370 and 43XX processors under SNA/SDLC and BSC • remote connection via leased lines or switched dial-up facilities to 3704/3705/3725 front-end communication processors.

Communication • CICS/VS under ACF/VTAM or ACF/TCAM for OS/VS and DOS/VS; ACF/NCP in IBM 3704/3705/3725 • single line; 2400/4800/9600-bps half-/full-duplex, under BSC; up to 19.2K bps for SNA/SDLC • ASCII codes • point-to-point/multipoint • RS-232C interface.

Operating Systems • service through the host processor under OS, DOS, DOS/VS, OS/VS1, OS/VS2, and DOS/VSE.

Database Management • none; only in association with host CICS/VS facilities.

Transaction Processing • primarily through CICS which acts as a terminal-oriented transaction monitor with file-processing facilities • supports send/receive batch and inquiry tasks.

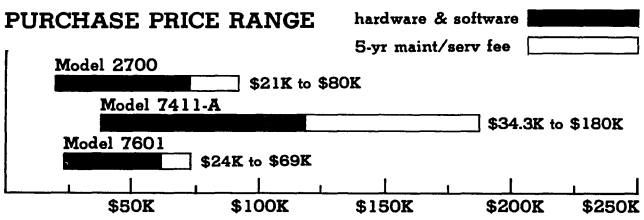
Support Software • supported by and employs software and program facilities of host processors • no local independent (from host) off-line programming/processing capabilities.

Terminals/Workstations • up to 32 CRTs and printers per cluster.

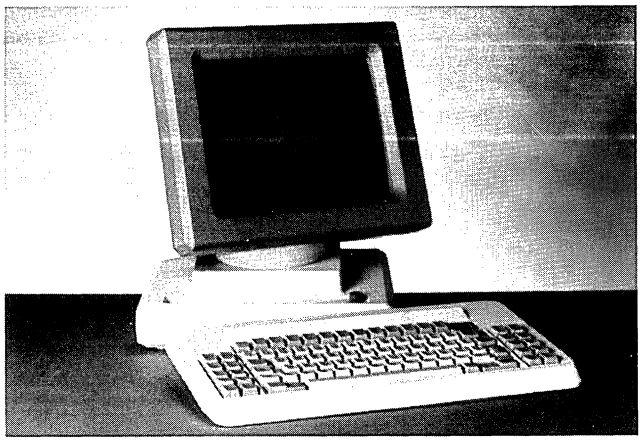
First Delivery • 1974.

Systems Delivered • about 12,000 controllers and 114,000 terminals.

PURCHASE PRICE RANGE



ITT COURIER 270 SERIES PURCHASE PRICING bar graph covers the price ranges between "small" and "large" configurations for hardware products (solid bars) and associated 5-year period maintenance (open bars) • **small Model 2700** consists of a 2710-01 cluster controller with 8 ports, 4 Model 2700-13 keyboard-displays, 2 Model 2700-16 keyboard-displays, and 1 Model 8742 serial character printer; **large system** consists of 2711-12 cluster controller with 16 ports, 8 Model 2700-13 keyboard-displays, 5 Model 2700-16 keyboard displays, a Model 8720 serial character printer, and a Model 6260 line printer • **small Model 741X** consists of a 7411-A cluster controller with 8 ports, 4 Model 2700-13 keyboard-displays, 2 Model 2700-16 keyboard-displays, and a Model 8742 serial character prints; **large system** consists of a 7411-A with 32 ports, 6 Model 2700-13 keyboard-displays, 4 Model 2700-15 keyboard-displays, 6 Model 2790-2A color keyboard-displays, 2 Model 8720 serial character printers, and 1 Model 6260 line printer • **small Model 7601** consists of a 7601-0 cluster controller with 8 ports, 4 Model 2700-13 keyboard-displays, 2 Model 2700-16 keyboard-displays and a Model 8742 serial character printer; **large system** consists of a 7601-16 cluster controller with 16 ports, 4 Model 2790-2A color keyboard-displays, 2 Model 8742 serial character printers, and a Model 8720 line printer • all prices are single-quantity purchase; volume discounts available.



Comparable Systems • Davox 1000, Harris 9200, IBM 3270, Memorex 2070, Telex TC 27X, NCR 7950, and others.

■ ANALYSIS

The ITT Courier 270 Series first appeared in 1974 as the Model 2700. Over the past decade, the line has been expanded and enhanced to cover most of the competitive moves made by IBM, and ITT has indeed profited. With some 113,000 displays, 12,000 controllers, and 15,000 printers in the field, it is probably the leading IBM 3270 competitor—at least in volume. Technically, the 270 Series appears to have fallen behind competitors such as IBM, Lee Data, Telex, and Harris, however.

While the 270 Series is certainly a strong competitor, a good portion of the product line borders on antiquated. For example, its Model 2700 Series cluster controllers are targeted as replacements for the IBM 3271 Models 1 and 2 and 3272 Models 11 and 12. Those products, along with the 3275, are **no longer marketed** by IBM. Since IBM doesn't have a reputation for abandoning lucrative markets, the market potential for these models is questionable.

The same applies to the terminals. ITT's lineup consists of lookalikes for the IBM 3277-2, 3278 Models 2 through 5, and the 3279-S2A color terminals. IBM has rendered those products technically obsolete and financially unattractive with its recently announced Models 3179 and 3180. The 3179 is a low-cost replacement for the 3279-S2A and S2B, while the 3180 Model 1 incorporates all of the display capabilities of the 3278 Models 2 through 5. The 3180 is also less expensive than the older 3278 and the current ITT offerings.

ITT certainly has the resources to build products like the 3179 and 3180 for the 270 Series. In fact, it offers just such terminals with its ITT 9000 product line. Models 9100 and 9230 duplicate the facilities of the 3179 and 3180, respectively, and are very price competitive. Those terminals were announced by ITT in April 1984; however, nothing like them has been hinted for the 270 Series. This could be an indication that the product line will be deemphasized in favor of the ITT 9000.

With the Model 741X and Model 7601 cluster controllers, ITT is in a strong position with respect to price and technical attributes. The 741X is composed of a series of units that replace IBM 3274 Models 1A, 1B, 1C, 31A, 21B, and 31C. The ITT units offer similar

 ©1984 Data Decisions

ITT Courier 270 Series
Information Display System

technical facilities as their IBM counterparts, but are now priced slightly higher than the 3274. But remember, the prices given in this report are single-quantity list prices. Every vendor discounts and all will deal.

The ITT 7601 is targeted at the IBM 3276 Models 1 through 4 and 11 through 14. The 7601 replaces only the control functions of the 3276, leaving the display facilities to the responsibility of the user. The 7601 does have one superior feature; it can attach up to 16 displays and printers while the 3276 can do no better than 7.

The weaknesses of the 741X and 7601 lies not with the controller, but with the attachable terminals. The same ones employed with the Model 2700 are used with these also.

While the ITT controllers offer capabilities similar to IBM's products, they lack some of the technical refinements found in controllers offered by Lee Data, Telex, and Harris. For example, all of those companies offer a multihost communications facility whereby 2 separate hosts can be concurrently accessed. In addition, Lee Data and Harris have controllers that allow concurrent interaction with a local and a remote host. Lee Data also offers a controller that supports asynchronous terminals as well as standard 3270-compatible units.

Two other competitive disadvantages for the 270 Series are its lack of a terminal multiplexer, and its dated practice of having all printers under cluster-only control. A terminal multiplexer combines multiple terminals on a single coaxial cable link. IBM, Lee Data, and Harris offer this beneficial product.

The practice of having printers under control of the cluster controller goes back to the original 3270 design. In fact, IBM still follows this practice. Some vendors, such as Davox and Telex, have removed this restriction by allowing a printer to be interfaced directly to the using terminal. This procedure eliminates the queuing delays when a print operation is needed but none is available, as is the case with shared cluster-controlled printers.

☐ Strengths

With IBM's latest round of price reductions, and its introduction of low-cost terminals a la the 3179 and 3180, most of the 270 Series strengths have been blunted. It does, however, retain one strength that is unmatched by any competitor: **redundant** control logic and power supplies.

Models 7412-A, -B, -C, which replace the aforementioned A, B, and C models of the IBM 3274, and the 2710-01/-12, which replace the 3272 are the only products of this type offering **redundant** control logic and power supplies. Such redundancy insures that the terminal cluster controller will remain online should either or both of these vital components fail. **Data Decisions** is a large proponent of component redundancy, and so are users with applications that cannot stand equipment failure. Banks and brokerage houses are very high on equipment redundancy.

Two other strengths are the 2 personal computer interfaces offered, and asynchronous communication support for terminal Models 2700-13 and 2790-2A. One personal computer interface allows the user to connect an IBM PC or equivalent directly to a Model 741X or 7601 controller. In this mode, the personal computer (PC) is loaded with ITT-supplied software which makes the PC emulate an IBM 3278-2. The interface, part number 7570, works with local and remote controllers.

The second interface permits an IBM PC (or equivalent) to be retrofitted to a monochrome terminal Model 2700-13 or color Model 2790-2A. This facility is similar to that employed by IBM for its 3278-2 retrofit, and provides concurrent support for host and PC programs on a roll-in/roll-out basis. An RS-232C interface is used to interconnect the PC and terminal.

This same RS-232C interface can be used for asynchronous communication between the 2700-13 or 2790-2A and an asynchronous host. While this does relieve the single-host communication restriction imposed on the cluster controllers, it really doesn't resolve the overall communication limitation since it does not support BSC or SDLC communication.

☐ Limitations

The limitations of this product line are much the same as those inherent with similar IBM components: no local processing unless PCs are used; no multihost addressing; no remote terminal dial-in; no data compression; and no print spooler. In addition, ITT-Courier, unlike IBM, has no terminal offering all format facilities of the 3278 Models 2 through 5, and no data encryption.

There are two major advantages associated with a multihost addressing facility. First and most obvious, users can interact with independent hosts simultaneously, making use of their processing power and databases. This speeds overall processing, simplifies distributed processing architectures, and reduces the load on the host, particularly if it is used for switching operations. As an example of the latter, take the case where a user in Philadelphia wishes to access a host in New York, but is connected to a host in Chicago. With a single-host addressing scheme, traffic flow in both directions would have to pass through Chicago. Aside from tying up the host, this arrangement also runs up communication costs. We realize there are ways to circumvent the Chicago loop by using network switches, multipoint multiplexers, dedicated lines between New York and Philadelphia, etc, but these solutions only add to the overall communications burden.

A possible solution would be to use the RS-232C interface on the 2700-13 and 2790-2A terminals to dial remote hosts. But as mentioned under Strengths, such a solution is limited to asynchronous hosts; not other 3270-like systems or IBM hosts. Of the principal vendors, Lee Data, Telex, and Harris offer multihost addressing. In addition, protocol converter vendors like Datastream and Protocol Computers Inc (PCI) also have this capability. The protocol converter vendors are also the only ones supporting remote terminal dial-in. This facility is extremely useful, especially with the growing use of remote personal computers, and/or off-site users.

The lack of a terminal such as the aforementioned IBM Model 3180 is more of a marketing limitation. By offering a unit that has all of the display characteristics of the 3282-2 through -5, the vendor can claim substantial cost savings by having one terminal replace four. They can also claim that such a device guards the user's investment since terminals will not become obsolete as applications change. All are very good arguments. In addition, IBM can further claim price advantage: the 3180 with keyboard costs $2,295, while the ITT Models 2700-13 through -16 are priced at $2,400, $2,700, $2,800, and $3,200, respectively.

When you have up to 32 devices operating online, you want every bit of the available bandwidth to count. A data compression capability provides such a service by eliminating unnecessary data such as zeros, blanks, and redundant characters. ITT should consider this facility.

Print spooling is a technique whereby information bound for a relatively slow device like a printer is placed on an auxiliary device (usually a disk). This allows the printer to operate at its normal speed and suffer its normal problems without effecting the overall data communication function. ITT has no spooler and it could certainly benefit from one. So could IBM for that matter.

Also, the lack of a terminal multiplexer is a significant limitation. It allows multiple terminals to share a single coaxial link to the cluster controller, thus saving on the cost and clutter of individual cables for each terminal-cluster link.

■ COMMUNICATIONS FACILITIES OVERVIEW

☐ Distributed Communications

The ITT Courier 270 Series communicates in a point-to-point or multipoint arrangement over switched or dedicated lines at speeds of 2400 to 19,200 bps in half-/full-duplex mode under BSC/SDLC protocols. ASCII characters are supported. Communication control rests with the IBM host terminal access methods. For the IBM S360/S370/3030/3081, and 4300, these include BTAM, BTAM-ES, TCAM, ACF/TCAM, VTAM, ACF/VTAM, ACF/VTAME, and EXTM. For a description of these access methods, see report 950-I048-3270.

 ©1984 Data Decisions

ITT Courier 270 Series
Information Display System

☐ Distributed Configurations

The 270 Series consists of 12 cluster controllers, 7 monochrome keyboard-display terminals, a color keyboard-display terminal, 6 serial character printers, and 4 line printers. The number of attachable terminals and printers varies with the cluster controller (see Controllers section), but the largest configuration attainable consists of 32 terminals and printers in any combination.

A basic system consists of 1 cluster controller and up to 8 display stations and/or printers configured in any combination; the only restriction is that at least 1 display station must be included. If more peripherals are required, they can be added in groups of 8 devices via terminal adapters. All peripherals attach directly to the cluster controller; peripherals can be located up to 5,000 feet from the controller.

The exception to the configuration rules rests with Models 7412A, B, and C; all 3 of these models can be ordered with redundant power supplies and control logic.

☐ Distributed Utilities

The 270 runs the same IBM utilities available to the 3270. These include the Display Exception Monitoring Facility, the Device Independent Display Operator Console Support, the Network Problem Determination Application; the Status Display Support, Interactive Instruction System, and the Service Level Reporter, Version 2. For a description of these utilities, see report 950-I048-3270.

ITT's diagnostics capture and display all data sequences between the cluster controller and the host mainframe. For remote controllers, the data stream is comprised of line traffic to or from the controller. For local controllers, the channel traffic is shown. Captured data can be frozen on the display screen or printed if desired. All data is presented in hexadecimal code.

For program development and maintenance, users may invoke the Format Reveal mode whereby the format attribute bytes, spaces, and nulls not normally displayed are translated into hex values for visual examination. Format Reveal can be activated by any display terminal attached to the cluster controller.

■ SOFTWARE

The 270 operates under the same applicable systems software as comparable IBM 3270 components. The following is a brief list of the Operating Systems, Data Management, Communications/Networks, and Applications Development Aids software that can be used by the 270. For a detailed description of this software, see report 950-I048-3270.

☐ Operating System

The 270 operates under OS, DOS, OS/VS1, OS/VS2(SVS), OS/VS2(MVS, MVS/SE, MVS/SP), DOS/VS, and DOS/VSE. It also runs under the Time Sharing Option (TSO).

☐ Data Management

Applicable data management software includes the advanced Text Management System II (ATMS-II), Airline Control Program (ACP), Customer Information Control System (CICS/VS), and Storage and Information Retrieval System (STAIRS/VS), and Information Management System (IMS and IMS/VS). See report 950-I048-3270.

☐ Communications/Networks

Communications access methods include ACF/VTAM and ACF/TCAM. In addition, the 7950 can take advantage of the facilities offered by ACF/NCP, the Network Communications Control Facility (NCCF), and the Network Problem Determination Application (NPDA). See report 950-I048-3270.

☐ Applications Development Aids

There are a host of application development aids available for the IBM 3270 that will also run on the ITT Courier 270. For example, the Display Management System (DMS/VS), Generalized Information System (GIS/VS), Structured Program Facility (SPF), Interactive System Productivity (ISPF), Virtual Storage Personal Computing (VSPC), and Graphical Data Display Manager & Presentation Graphics Feature (GDDM & PGF) all run on the 270. See report 950-I048-3270.

■ HARDWARE

☐ Terms & Support

Terms • available for purchase or on a 2-/3-/5-year lease • leased units include maintenance • quantity discounts available.

Support • on-site service by vendor personnel available in 2 plans called Platinum and Gold • mail-in/carry-in service called Silver Plan • Platinum Plan calls for complete maintenance on a scheduled basis; system problems reported to regional service centers and a field engineer is dispatched • Gold Plan provides same level of service, except engineer calls on a prearranged schedule or after a certain number of elements require service • Silver Plan calls for the mail-in/carry-in of failed components; repaired units are returned to customer site or to regional carry-in centers.

☐ Packaged Components/Overview

The 270 Series is a family of cluster terminal systems that emulate the IBM 3270 Information Display System operating with the characteristics and features of an IBM 3271/3272/3274/3276 control unit (cluster controller) with attached 3178, 3277-2, 3278 Models 2, 3, 4, and 5, and 3279-S2A keyboard-display terminals; and IBM 3287/3262 printers. While ITT offers no personal computer for attachment to the cluster controllers, it does provide an interface to attach an IBM PC or equivalent to a Model 741X or 7601 cluster controller. In addition, the vendor allows 2 of its terminals (Models 2700-13 and 2790-2A) to be retrofitted with a personal computer in much the same manner IBM employs for its 3278 and 3279 (see Workstations/Terminals for details).

The cluster controllers are designated Models 2700, 741X, and 7601. Model 2700 includes remote controllers which emulate the IBM 3271 Models 1 and 2, and 3272 Models 11 and 12.

The 741X is available in local and remote versions intended as IBM 3274-A, -B, and -C model replacements. The 7601 replaces the controller portion of the IBM 3276 Models 1 through 4 and 11 through 14.

All cluster controllers are delivered with a device adapter that accommodates up to 8 terminals and printers. The 2700 and 741X models will accept 3 additional device adapters that support up to 32 peripherals. The 7601 is offered with 1 or 2 device adapters, supporting 8 or 16 peripherals, respectively. Field upgrades are permitted.

The display station/terminal combination is configured into groups of 8 devices. Any combination of display stations and printers is acceptable. User-specified configurations are software defined, with the user specifying devices and their assignments from the keyboard. All configurations are held on a diskette integrated into the cluster controller.

Configuring the system involves selecting options and features that modify systems software, enabling and disabling display stations and printers, and defining operating modes for stations and printers. Configurations are held on a systems diskette and loaded into the controller upon operator command.

The local controllers attach to the local host via (selector, byte, or block multiplexer) channels. The remote controllers communicate half-/full-duplex over point-to-point/multipoint switched or dedicated lines at speeds from 2400 to 9600 bps for BSC operation, and 2400 to 19,200 bps for SDLC. An RS-232C interface connects the controller to the modem.

☐ Controllers

A series of cluster controllers are available for local or remote attachment to the host processor. The 2700, 741X, and 7601 Series controllers replace many of the older IBM 3271, 3272, 3274, and 3276 controllers, and are offered in configurations that support 8 to 32 terminals or printers.

The ITT Model 2700 Series, for example, are remote controllers that replace the now-discontinued IBM 3271 Models 1 and 2, and

 ©1984 Data Decisions

ITT Courier 270 Series
Information Display System

3272 Models 11 and 12. Up to 32 terminals and printers can be intermixed in any combination, provided that at least 1 device is a display station. Supporting the controllers are the Model 2700 display stations, 2790 color display, and the 2760/8700 Series printers.

The 741X local/remote series consists of the 7411-A, -B, and -C that replace 3274 Models 1A, 1B, 1C, 31A, 21B, and 31C. The basic ITT controllers contain a single device adapter (attaches 8 displays/printers); 3 additional device adapters are optional. In addition to the standard versions of these controllers, ITT offers versions with **redundant** control logic and power supplies. These units, consisting of 7412A local SNA, 7412B local 3272, and 7412C remote BSC/SDLC, provide a high-degree of system integrity. The 741X controllers support the same displays/printers as the 2700 Series.

Model 7601 consists of 3 different remote controllers designed as replacements for the IBM 3276. Model 7601-1 replaces 3276 Models 1, 2, 3, and 4 and contains a single device adapter. Model 7601-1 replaces 3276 Models 11, 12, 13, and 14, and also contains a single device adapter. The 7601-16 is the same as Model 7601-1, but supports 16 displays/printers (2 device adapters included as standard equipment); all support the same peripherals as the Model 2700. With the 741X and 7601 controllers, peripherals can be located up to 5,000 feet away. With the 2700 Series, each peripheral can be located up to 2,000 feet from the controller.

ITT does permit field-upgrade of the following controllers: 2710-01 to 2711-01; 2711-01 to 2711-12; 2712-01 to 2712-12; 2710-01 to 3274/3276 compatibility; 2710-12 to 3274/3276 compatibility; 2711-12 to 7411; 2712-12 to 7412; and 7601-X to 7601-16.

For those requiring a local processing capability, ITT provides a personal computer attachment interface (#7570) for Model 741X and 7601 controllers. The interface attaches the IBM Personal Computer or equivalent device to the controller, and emulates the IBM 3278-2. It supports BSC and SNA/SDLC in local and remote environments, and supports services such as file transfer between the host and personal computer.

For those who wish to retrofit a personal computer to an existing display, ITT provides such an interface for its Model 2700-13 monocromatic display and Model 2790-2A color terminal. Concurrent operation of both host and personal computer programs are supported via roll-in/roll-out operation. Interface between the terminal and personal computer is via an RS-232C port.

Model 2700 Series Remote Cluster Controllers

A family of floor-console cluster controllers which support 8 to 32 display stations or printers; single device adapter (standard) supports 8 displays/printers on 2710-01 and -12 • half-/full-duplex communication with IBM S/360, S/370, 4300, and 30XX processors at speeds up to 19.2K bps under SNA/SDLC and 9600 bps under BSC • single high-speed link • RS-232C interface.

Model 2710-01 • 8-port controller; nonexpandable • BSC protocol:

$103/$94 mo	$2,050 prch	$43 maint

Model 2710-12 • 8-port controller; nonexpandable • SDLC protocol:

103/94	3,500	59

Model 2711-01 • 16-port controller; expandable to 32 ports • BSC protocol:

180/164	2,050	49

Model 2711-12 • 16-port controller; expandable to 32 ports • SDLC protocol:

186/176	4,400	69

Model 2712-01 • 16-port controller with redundant power supply and control logic • BSC protocol:

299/271	2,350	49

Model 2712-12 • 16-port controller with redundant power supply and control logic • SDLC protocol:

299/271	7,700	69

1214 Upgrade • upgrades 2710-01 to 2711-01:

NA/NA	320	NC

1218 Upgrade • upgrades 2711-01 to 2711-12:

NA/NA	522	NC

1219 Upgrade • upgrades 2712-01 to 2712-12:

NA/NA	NA	NA

7514 Upgrade • upgrades 2710-01 to 3274/3276 compatibility:

NA/NA	320	NC

7515 Upgrade • upgrades 2710-12 to 3274/3276 compatibility:

NA/NA	320	NC

7516 Upgrade • upgrades 2711 to 7411:

NA/NA	584	NC

7517 Upgrade • upgrades 2712-12 to 7412:

NA/NA	858	NC

7411 & 7412 Local Cluster Controllers

Floor-console cluster controllers support 8 to 32 display stations or printers • single device adapter (standard) supports 8 displays/printers • attaches directly to local host S/360, S/370, and 303X processors via byte, selector, or block multiplexer channels; connects to 4300 via byte or block multiplexer.

Model 7411-A • 8-port controller; upgradeable to 32 ports • local SNA protocol • compatible wtih 3274-A models:

$411/NA mo	$15,200 prch	$110 maint

Model 7411-A • 32-port controller • local SNA protocol • compatible with 3274-A models:

466/441	16,350	80

Model 7411-B • 8-port controller; upgradeable to 32 ports • local 3272 mode operation • compatible with 3274-B models:

411/NA	15,200	110

Model 7411-B • 32-port controller • local 3272 mode operation • compatible with 3274-B models:

466/411	16,350	80

Model 7412-A • 32-port controller with redundant control logic and power supply • compatible with IBM 3274-A models:

776/714	24,500	83

Model 7412-B • 32-port controller with redundant control logic and power supply • compatible with IBM 3274-B models:

776/714	24,500	83

Model 7412-C • 32-port controller with redundant control logic and power supply • compatible with IBM 3274-C models:

563/516	18,300	65

7501 Device Adapter • provides 8 ports for attachment of displays/printers to Model 7411 controllers:

11/9	550	2

7570 Personal Computer Attachment • permits attachment of IBM Personal Computer (or equivalent) to Model 741X and 7601:

NA/NA	825	3

Model 7411-C Remote Cluster Controllers

Floor-console cluster controllers that support from 8 to 32 display stations or printers • single device adapter (standard) supports 8 displays/printers • communicates with S/360, S/370, 303X, and 4300 processors at speeds of 2400 to 19,200 bps via communication facility • BSC/SDLC • RS-232C interface.

MO: monthly 2-year/3-year lease price includes maintenance. PRCH: purchase price. MAINT: monthly maintenance fee. NC: no charge. NA: not available/applicable. All prices single quantity. Prices effective as of July 1984.

©1984 Data Decisions

ITT Courier 270 Series
Information Display System

Model 7411-C • 8-port controller; upgradeable to 32 ports • BSC/SDLC protocol • compatible with 3274-C models:

$318/NA mo	$11,400 prch	$95 maint

Model 7411-C • 32-port controller • BSC/SDLC protocol • compatible with 3274-C models:

363/343	12,350	62

Model 7411-C • 16-port controller with redundant power supply and control logic • BSC/SDLC protocol • compatible with 3274-C models:

563/516	18,300	65

7501 Device Adapter • provides 8 ports for attachment of displays/printers to Model 7411 controllers:

11/9	550	2

7502 Device Adapter • provides 8 ports for attachment of displays/printers to Model 7412 controllers:

20/18	1,100	2

7570 Personal Computer Attachment • permits attachment of IBM Personal Computer (or equivalent) to Model 741X and 7601:

NA/NA	825	3

7502 Redundant Device Adapter • provides redundant 8 ports for Model 7412 controllers with redundant option:

20/18	1,100	2

Model 7601 Remote Cluster Controllers

A tabletop cluster controller that supports 8 or 16 display stations or printers • single device adapter (standard) supports 8 displays/printers • attaches to S/360, S/370, or 4300 processors via 2701 Data Adapter Unit, 2703 or 3704/3705/3725; attaches to 8100 processor via data link attachment • single high-speed data link; 2400 to 9600 bps under BSC and 2400 to 19,200 bps for SDLC • RS-232C interface.

Model 7601-0 • 8-port controller • BSC protocol • compatible with 3276 Models 1, 2, 3, and 4:

$153/$139 mo	$5,000 prch	$25 maint

Model 7601-1 • 8-port controller • SDLC protocol • compatible with 3276 Models 11, 12, 13, and 14:

153/139	5,000	25

Model 7601-16 • 16-port controller • BSC/SDLC protocol • compatible with 3276 Models 1, 2, 3, 4, 11, 12, 13, and 14:

227/205	7,450	40

7525 Controller Upgrade • upgrades 7601-X to 7601-16:

74/66	2,450	15

☐ I/O Channels

Model 2700, 741X, & 7601 Remote Processor Attachment

Controllers communicate with the host processor via switched or dedicated facilities and host channel-connected control units/adapters. On the S/360, 370, 3030, and 4300 processors, communication facilities connect via 2701 Data Adapter Unit, 2703 Transmission Control, or 3704/3705 communication controllers. On the S/370 Models 115, 125, 135, and 138 connection is via an Integrated Communications Adapter; the Communications Adapter is used on the 4331.

Model 741X Local Processor Attachment

Controllers directly connect to a local host via processor channels. From 8 to 32 BSC/SDLC terminals in 8-terminal increments can be attached. No more than 32 terminals or 31 printers are permitted. Controllers attach to an S/360, 370/115 through 370/168, 3031, 3032, 3033, and 3081 processors via a byte, selector, or block-multiplexer channel. Any 4300 processor attaches via a block or byte multiplexer. A microprocessor-controlled channel adapter handles data transfers and provides diagnostics.

Terminal-/Printer-to-Controller Attachment

Display terminals/printers attach directly at cluster controllers to device adapters; each adapter handles 8 printers/terminals. Up to 32 BSC/SDLC terminals/printers are accommodated and attach via coaxial cable. With the 741X and 7601 controllers, peripherals can be located up to 5,000 feet from the controller. With the 2700 Series controllers, the distance is limited to 2,000 feet.

For personal computer attachment, ITT offers the Model 7570 personal computer attachment interface which attaches an IBM Personal Computer or equivalent to a 741X or 7601 controller. In addition, the vendor permits the Models 2700-13 and 2790-2A terminals to interface a personal computer via an RS-232C auxiliary port and attachment feature 1199. Feature 1199 requires some modification to the PC's MS-DOS operating system, but does allow the 2700-13 and 2790-2A to support concurrent host and personal computer programs.

1199 Personal Computer Attachment Kit • MS-DOS 1.25 diskette; loopback test connector; RS-232C cable • price quoted.

7501 Device Adapter • provides 8 ports for attachment of displays/printers to Model 7411 controllers:

$11/$9 mo	$550 prch	$2 maint

7502 Device Adapter • provides 8 ports for attachment of displays/printers to Model 7412 controllers:

20/18	1,100	2

7570 Personal Computer Attachment • permits attachment of IBM Personal Computer (or equivalent) to Model 741X and 7601:

NA/NA	825	3

7502 Redundant Device Adapter • provides redundant 8 ports for Model 7412 controllers with redundant option:

20/18	1,100	2

☐ Communications

All remote controllers support BSC or SNA/SDLC communication protocols, and communicate with a host processor via half-/full-duplex transmission. Facilities can be leased or dial-up, point-to-point, or multipoint. Data transmission speeds are 2400 to 19,200 bps for SNA/SDLC devices, and 2400 to 9600 bps for BSC. An RS-232C interface connects the controller to the modem. All transmission is block mode.

Diagnostics consist of a capture mode facility for local and remote controllers. When activated, it functions as a monitor to capture and display all data sequences between the terminal controller and the mainframe. For remote terminal controllers, this data stream is comprised of the line traffic to and from the controller. For local terminal controllers, the channel traffic is shown. For more information, see Distributed Utilities.

☐ Diskette

Like most 3270-compatible products, the 270 Series employs a diskette to store system configurations, tables, utilities, and support software. Users can modify the contents from the control terminal keyboard, and they may also create duplicate copies of the configuration or develop multiple configurations as processing needs dictate. The diskette cannot be used to store local applications, however.

☐ Workstations/Terminals

ITT Courier provides an extensive lineup of monocromatic terminals and color display for use with a family of cluster controllers. For the most part, the ITT displays duplicate the functions of the IBM Models 3178, 3277, 3278, and 3279. While ITT does not offer a personal computer with this series, they do provide an interface which allows an IBM Personal Computer (or equivalent) to be attached to the Model 741X and 7601 controller.

The ITT Model 1700 display terminal is the equivalent of the IBM 3178. Both display 1920 characters and come with typewriter-style and data-entry keyboards. The price is also about the same: $1,660 for IBM versus $1,450 for ITT.

The ITT Model 2700-1X consists of 4 models similar to the IBM 3278 Models 2 through 5. In addition, IBM and ITT are priced about the same when you add in the cost of keyboards. In the current marketplace, however, ITT is at quite a disadvantage

 ©1984 Data Decisions

ITT Courier 270 Series
Information Display System

when compared with IBM's new Model 3180. That terminal incorporates all of the display capabilities of the 3278 Models 2 through 5 and includes a keyboard. The price is $2,295, placing it below any model in the 2700-1X line.

The ITT Model 2700-0X display is equivalent to the IBM 3277-2. Like the IBM offering, this unit displays 1920 characters and can be fitted with an APL keyboard. As for price, ITT is cheaper by about $500 per unit.

The color display unit offered by ITT is the Model 2790-2A, a 4-color terminal equivalent to the IBM 3279-S2A. Used with the Model 7411/7412/7601 controllers, the 2790-2A provides a 1920-character display and can present 7 colors. ITT used to offer 2 other models in the 2790 family with more extensive display formats. The 2790-3A could display 2560 characters in a 32-line x 80-character format; and the 2790-4A had a 3440-character, 43-line x 80-character format. Neither product, however, is shown on the price list, but they may be available on special order. While the 2790-2A is delivered as a 4-color display, ITT sells an upgrade kit for $100 which converts the unit to 7 colors, making the 2790-2A the equivalent of the IBM 3279-S2B.

As for price, the 2790-2A and 3279-S2A are about $500 apart in ITT's favor. Unfortunately for ITT, they probably will no longer be competing against the 3279. Last Spring, IBM introduced the Model 3180 which essentially replaces the 3279-S2A. The new unit sells for $2,295 including keyboard, and includes a 4-page (7680-character) screen buffer that can be vertically scrolled. The $3,100 Model 2790-2A is no match for the new IBM product.

In addition to these standard terminals, ITT offers a family of 3277/3278 replacement terminals which can be attached to IBM cluster controllers with Category A and B peripheral support. The ITT 2780 Models 13, 14, and 15 are targeted at the IBM 3278 Models 2, 3, and 4, while the ITT Model 2770-03 is a 3277-2 replacement. Since these terminals essentially duplicate the facilities offered by the 2700-1X and 2700-0X, they are not detailed in the following discussion.

For those requiring a personal computer facility, ITT offers 2 attachment techniques: direct attachment of an IBM PC or equivalent to a 741X or 7601 controller; or retrofitting the PC to the Model 2700-13 and 2790-2A. For the latter, the PC interfaces with the terminals via an RS-232C port and employs the terminal's keyboard and display facilities. Concurrent host and personal computer operation is supported via roll-in/roll-out operation. This same RS-232C interface can be used for **asynchronous** communications between the terminal and an asynchronous host outside of host-controlled network.

Model 1700-2X Display Terminal

Configuration • cluster display employed with Model 2700, 741X, and 7601 cluster controllers • modular detached typewriter-style or data-entry keyboards with separate numeric keypad.

Display • 12-inch diagonal • 7x14 dot matrix • 1920-character, 24-line x 80-character format • 94 EBCDIC or ASCII character set • blink and nonblink underscore and block cursor.

Edit & Format Features • cursor up, down, left, right pad; home, new line, tab, backtab, backspace key functions • cursor address write • erase to EOF; clear input, clear • character insert and delete • protected and numeric-only fields • selector light pen field select • blink, intensity, reverse video, underscore, nondisplay attributes.

Communications • via controller—see Communications for details.

Peripherals • mag card slot reader or mag hand scanner • cluster printers via controller.

Keyboards • typewriter-style or data-entry keyboards with 24 program function keys (12 shiftable) and separate numeric keypad.

Model 1700-21 • 1920-character display with data-entry-style keyboard:

NA/NA mo	$1,450 prch	$10 maint

Model 1700-22 • 1920-character display with typewriter-style keyboard:

NA/NA	1,450	10

Model 2700-1X Display Terminals

Configuration • cluster display employed with Model 2700, 741X, and 7601 cluster controllers • modular detached typewriter, data entry keypunch, or data entry keyboards with numeric keypad.

Display • 14-inch diagonal • 7x10 dot matrix • 3564-character, 27-line x 132-character format (Model 16); 3440-character, 43-line x 80-character format (Model 15); 2560-character, 32-line x 80-character format (Model 14); 1920-character, 24-line x 80-character format (Model 13); all have extra status indicator line • 64 or 96 ASCII character set • blinking cursor.

Edit & Format Features • cursor up, down, left, right, pad; home, new line, tab, backtab, backspace key functions • cursor address write • erase EOF; clear input • character insert and delete • protected and numeric-only fields • blink, intensity, reverse video, underscore, nondisplay attributes • select light pen field select • typematic.

Communications • via controller—see Communications section for details • RS-232C auxiliary port for asynchronous communication.

Peripherals • mag card slot reader and light pen • cluster printers via controller.

Keyboards • typewriter-style with 24 program function keys (12 shiftable) and separate numeric keypad • standard data-entry keypunch style • data-entry with numeric keypad.

Model 2700-13 • 1920-character display with choice of keyboard • RS-232C asynchronous communication port:

$76/$69 mo	$2,400 prch	$10 maint

Model 2700-14 • 2560-character display with choice of keyboard:

83/76	2,700	11

Model 2700-15 • 3440-character display with choice of keyboard:

87/80	2,800	13

Model 2700-16 • 3564-character display with choice of keyboard:

86/83	3,100	16

Model 2700-0X Display Terminals

Configuration • cluster display employed with 2700, 741X, and 7601 cluster controllers • modular detached standard typewriter-style, data-entry, or APL keyboards standard.

Display • 14-inch diagonal • 7x10 dot matrix • 1920-character, 24-line x 80-character format • 64 or 96 ASCII character set; 204 EBCDIC/APL (Model 05).

Edit & Format Feature • cursor up, down, left, right, pad; new line, tab/skip, backtab, backspace key functions • cursor address write • erase EOF; clear input • character insert and delete • protected and numeric-only fields • light pen field select • intensity, nondisplay attributes • typematic.

Communications • via controllers—see Communications section for details.

Peripherals • mag slot card reader • cluster printers via controller.

Keyboards • Models 1003, 1009, 1011, 1012, 1013.

Model 2700-03 • 1920-character display • typewriter- or data-entry-style keyboard:

$57/$53 mo	$1,850 prch	$25 maint

Model 2700-05 • 1920-character display • APL keyboard:

76/73	1,850	25

 ©1984 Data Decisions

ITT Courier 270 Series
Information Display System

Model 2790-2A Color Display Terminal

Configuration • cluster color display employed with Model 7411/7412 and 7601 cluster controllers • modular detached typewriter-style, data-entry, or data-entry keypunch keyboards.

Display • 14-inch diagonal • tilt and swivel base • 4-color display; 7-color presentation (red, white, blue, green, turquoise, pink, and yellow) • 1920-character, 24-line x 80-character format (Model 2A) • upgradeable to 7-color display.

Edit & Format Features • cursor up, down, left, right pad; home, new line, tab, backtab, backspace key functions • cursor address write • erase to EOF; clear input, clear • character insert and delete • protected and numeric-only fields • light pen field select • typematic.

Communications • via controller—see 3270 Communications section for particulars • RS-232C asynchronous communication port.

Peripherals • mag card slot reader and light pen • cluster printers via controller.

Keyboards • typewriter-style with 24 program function keys (12 shiftable) and separate numeric keypad • standard data-entry keypunch style • data entry with numeric keypad.

Model 2790-2A Color Display Terminal • 4-color, 1920-character display with choice of available keyboards • RS-232C asynchronous communication port:

$86/$83 mo	$3,100 prch	$16 maint

1600 Color Upgrade • upgrades 2790-2A from 4-color to 7-color display capability:

NA/NA	100	NC

☐ Keyboards

3277-Style Keyboards

1003 Typewriter Keyboard • typewriter-style with numeric keypad:

$3/$3 mo	$100 prch	$1 maint

1009 APL Keyboard • APL-style with numeric keypad:

3/3	100	1

1011 Cascade Typewriter Keyboard • cascade style:

1/1	20	NC

1012 Cascade Data-Entry Keyboard • cascade style:

1/1	20	NC

1013 Cascade-Numeric Keyboard • cascade style with numeric keypad:

4/4	120	3

3278-Style Keyboards

1033 Typewriter Keyboard • typewriter-style with numeric keypad and 12 program function keys:

$6/$5 mo	$180 prch	$1 maint

1034 Typewriter Keyboard • typewriter-style with 24 program function keys:

3/3	125	1

☐ Printers

ITT offers a fairly wide range of serial character and line printers for attachment to the cluster controllers. Printers are used on a shared basis by the terminals, and can be used for locally initiated or host-initiated print operations.

Model 87XX Printers

Configuration • tabletop serial matrix impact printers • 1920-character buffer • cluster printers for 2700, 741X, and 7601 cluster controllers.

Printer • 60 cps (Model 8740), 120 cps (Model 8742), 180 cps (Model 8744), 150 cps (Model 8710), 240 cps (Model 240 cps), and 55 cps (Model 8760) £ 80-/132-column line • 64 ASCII character set; 96 characters optional • adjustable tractor feed from 3 to 14 inches wide and 11 inches long • 10 cpi horizontal; 6 lpi vertical; 3/4/6/8 lpi on Models 8720/8725; 6/8 lpi on Models 8710 and 8740 • bidirectional printing.

Model 8740 • 60 cps; 132 columns:

$74/$71 mo	$1,855 prch	$44 maint

Model 8742 • 120 cps; 132 columns:

99/44	3,030	44

Model 8744 • 180 cps; 132 columns:

124/120	3,800	72

Model 8710 • 150 cps; 132 columns:

147/137	4,100	45

Model 8720 • 240 cps; 132 columns:

195/180	5,100	56

Model 8760 • 55 cps; 132 columns:

149/143	3,970	46

Model 27XX Line Printers

Configuration • pedestal-mounted belt printers • 1920-character print buffer • cluster line printer for 2700, 741X, and 7601 cluster controllers.

Printer • 115 and 340 lpm (Model 2762) and 240 and 340 lpm (Model 2766) • 64 or 96 printable characters • 10-cpi horizontal print; 6 lpi vertical • 6-part continuous forms, 3 to 15 inches wide • 132-column print line.

Model 2762 • 115 and 340 lpm:

$196/$184 mo	$5,615 prch	$118 maint

Model 2766 • 240 and 340 lpm:

232/221	7,300	144

Model 62X0 Line Printers

Configuration • floor-mounted belt printers • cluster line printer for 741X and 7601 controllers • functionally compatible with IBM 3262-3, -13.

Printer • 300 lpm (Model 6230) and 600 lpm (Model 6260) • 48- or 64-character ASCII uppercase characters or 96 upper- and lowercase characters • 3/4/6/8-lpi vertical spacing; 10 cpi horizontal • 6-part forms, 3 to 15 inches wide • 132-column print line.

Model 6230 • 300 lpm:

$306/$288 mo	$11,350 prch	$114 maint

Model 6260 • 600 lpm:

433/405	13,550	133

• END

©1984 Data Decisions

ITT Courier 9000 Series
Information Display System

■ PROFILE

Function • clustered display-terminal system for inquiry/update, data entry, interactive program development, and report generation • all processing and database services performed by the host • emulates IBM 3274 cluster controllers; 3178, 3179, 3180, 3278, and 3279 display terminals; and 3287/3262/3268 printers.

Architectures Supported • used with IBM S/370 and 43XX processors under SNA/SDLC and BSC • remote connection via leased lines or switched dial-up facilities to 3704/3705/3725 front-end communication processors.

Communication • CICS/VS under ACF/VTAM or ACF/TCAM for OS/VS and DOS/VS; ACF/NCP in IBM 3704/3705/3725 • single line; 2400/4800/9600-bps half-/full-duplex, under BSC; up to 19.2K bps for SNA/SDLC • ASCII codes • point-to-point/multipoint • RS-232C interface.

Operating Systems • service through the host processor under OS, DOS, DOS/VS, OS/VS1, OS/VS2, and DOS/VSE.

Database Management • none; only in association with host CICS/VS facilities.

Transaction Processing • primarily through CICS, which acts as a terminal-oriented transaction monitor with file-processing facilities • supports send/receive batch and inquiry tasks.

Support Software • supported by and employs software and program facilities of host processors • no local independent (from host) off-line programming/processing capabilities.

Terminals/Workstations • up to 32 CRTs and printers per cluster.

First Delivery • 1984.

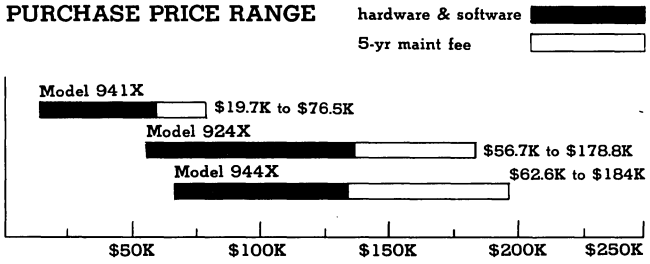
Systems Delivered • not disclosed.

Comparable Systems • Davox 1000, Harris 9200, IBM 3270, Memorex 2070, Telex TC 27X, NCR 7950, and others.

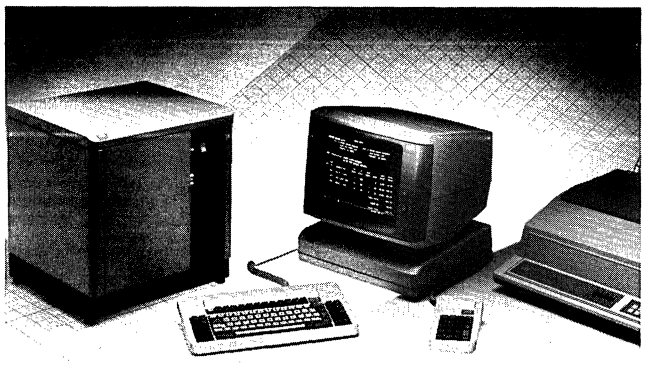
Vendor • ITT Courier Terminal Systems, Inc; P.O. Box 29039, Phoenix, AZ 85038 • 602-894-7000.

Distribution • worldwide through direct sales offices and manufacturer representatives.

PURCHASE PRICE RANGE



ITT COURIER 9000 SERIES PURCHASE PRICING bar graph covers the price ranges between "small" and "large" configurations for hardware products (solid bars) and associated 5-year period maintenance (open bars) • **small** Model 9410 consists of an 8-port cluster controller, 3 Model 9230 keyboard displays, and 2 Model 9301 120-cps printers; **large** Model 9416 consists of a 16-port cluster controller, 6 Model 9230s, 2 Model 9236 color keyboard displays, and 2 Model 9304 400-cps printers • **small** Model 9420 consists of an 11-port cluster controller, 4 Model 9230s, 4 Model 9236s, and 2 Model 9304s; **large** Model 9420 consists of a 32-port cluster controller, 8 Model 9230s, 8 Model 9236s, 2 Model 9301s, 4 Model 9304s, and 2 Model 9342 720-lpm line printers • **small** Model 9440 consists of an 11-port cluster controller, 4 Model 9230s, 4 Model 9236s, and 2 Model 9304s; **large** Model 9440 consists of a 32-port cluster controller, 8 Model 9230s, 8 Model 9236s, 2 Model 9301s, 4 Model 9304s, and 2 Model 9342s • all prices single-quantity purchase.



■ ANALYSIS

The 9000 Series is ITT Courier's product of the future in its battle to retain the prominent position it has held in the IBM 3270-replacement market. At this writing, ITT with some 12,000 Series 270 controllers and 114,000 terminals, far outstrips its competition and is second only to IBM, which dominates the market with well over 1 million terminals installed.

The 9000 Series moves the ITT product line into more contemporary waters. Its cluster controllers are aimed at the IBM 3274 market, and its new terminals are more like IBM's 3178, 3179, and 3180. The products are also priced more in line with IBM's latest offerings as well.

Prior to the 9000 Series, ITT Courier's product line revolved around its 10-year old 270 Series. Although it was a strong contender and a prominent product, it now borders on obsolescence by comparison with the state of the art. Its 2700 Series cluster controllers are targeted at the IBM 3171 and 3272, 2 controllers IBM no longer markets. The 270 Series terminals are also out-of-date, since they are replacements for the IBM 3277-2 and 3278 Model 2 through 5. While IBM still markets those terminals, the 3278 line will undoubtedly be replaced by the new 3180 Model 1 that IBM introduced this year. Current IBM 3279 models will also undoubtedly be replaced by the newer, lower-cost Model 3179.

With the 9000 Series, ITT Courier has products comparable in function and, for the most part, lower in price than the latest IBM gear. ITT Courier also intends to guard its existing customer base by not eliminating the 270 Series immediately. Rather, it has adopted a marketing strategy of product compatibility by allowing all of the 270 Series terminals to be used with the new Model 94XX cluster controllers, thereby protecting its users' investment. This strategy allows users to move up to more powerful controller facilities without incurring the cost of new terminals until they are needed.

Despite its new products, ITT Courier has not moved to establish technical superiority over IBM or its leading competitors. For example, Lee Data, Telex, and Harris all offer controllers with a multihost communication facility whereby 2 separate hosts can be concurrently addressed. In addition, Lee Data and Harris controllers allow concurrent interaction with local and remote

 ©**1984 Data Decisions**

ITT Courier 9000 Series
Information Display System

hosts. Lee Data also offers a controller that supports asynchronous terminals as well as standard 3270-compatible units. Note that IBM has none of these facilities either.

It would not be surprising that ITT Courier may also be developing similar facilities. In the past, ITT Courier has responded to changing markets with strong new products. The new cluster controllers and terminals are examples, as is the addition of a terminal multiplexer that allows up to 8 terminals to share a single coaxial cable. Also, ITT Courier's new Model 9230 and 9236 terminals can each directly accommodate printers. Neither the terminal multiplexer nor direct printer attachment is offered with the 270 Series, and **Data Decisions** faulted those products for those limitations.

In its existing configuration, the 9000 Series principal marketing strength is price; but remember, everyone discounts and IBM has been very aggressive in this area. Price alone may not be good enough anymore.

☐ Strengths

Aside from price, the principal strengths of the 9000 Series are redundancy offered with the cluster controllers; its flexible personal computer interface scheme; and support for ITT Courier's new XTRA personal computer. The first 2 are carryovers from the 270 Series; the latter is a new product.

The 9000 Series cluster controllers include Models 9410, 9416, 9420, 9422, 9440, and 9442. The 9410 and 9416 are 3274 Model 51C and 61C replacements; the 9420 and 9422 are 3274 Model 21C, 31C, and 41C competitors; and the 9440 and 9442 are aimed at the 3274 Model 21A, 31A, and 41A markets. With the 9422 and 9442, however, the control logic and power supplies are fully redundant and automatically switch over should the primary unit fail. (ITT Courier offers the same facility on its Model 7412 in the 270 Series.)

ITT Courier offers the user 2 choices for connecting personal computers to its 94XX controllers. The first is a personal computer adapter (part 7570) that fits into the controller and accommodates an IBM PC (or equivalent). The other choice is ITT Courier's new XTRA personal computer, which is comparable to IBM's PC/XT and runs most of its software. The XTRA is an impressive product that features monochrome and color monitors, up to 768K bytes of RAM, 4 360K-byte diskette drives, and an integral 10M-byte Winchester hard disk. While this product does not support windowing (a la the 3270 PC), boards are available from independents that provide this service.

Another user benefit is the ability to directly interface a serial matrix printer with the Model 9230 and 9236 terminals. Direct attachment eliminates print queuing that can occur with cluster-controlled shared printers. IBM only offers this feature with the 3180 Model 1.

The X.25 interface option is another strong user benefit for the 9000 Series. If properly certified, this link allows users to connect to public data networks (PDNs), which somewhat softens the impact of the 9000's inability to directly interface with more than one host. IBM also has an X.25 interface.

☐ Limitations

The limitations of this product line are much the same as those inherent with similar IBM components: no multihost addressing; no remote terminal dial-in; no data compression; and no print spooler.

There are 2 major advantages associated with a multihost addressing facility. First and most obvious, users can interact with independent hosts simultaneously, making use of their processing power and databases. This speeds overall processing, simplifies distributed processing architectures, and reduces the load on the host, particularly if it is used for switching operations. As an example of the latter, take the case where a user in Philadelphia wishes to access a host in New York, but is connected to a host in Chicago. With a single-host addressing scheme, traffic flow in both directions would have to pass through Chicago. Aside from tying up the host, this arrangement also runs up communication costs. We realize there are ways to circumvent the Chicago loop by using network switches, multipoint multiplexers, dedicated lines between New York and Philadelphia, etc, but these solutions only add to the overall communications burden.

When you have up to 32 devices operating online, you want every bit of the available bandwidth to count. A data compression capability provides such a service by eliminating unnecessary data such as zeros, blanks, and redundant characters. ITT Courier should consider this facility.

Print spooling is a technique whereby information bound for a relatively slow device like a printer is placed on an auxiliary device (usually a disk). This allows the printer to operate at its normal speed and suffer its normal problems without effecting the overall data communication function. ITT Courier has no spooler, and its users as well as IBM users, could certainly benefit from one.

■ COMMUNICATIONS FACILITIES OVERVIEW

☐ Distributed Communications

The ITT Courier 9000 Series communicates in a point-to-point or multipoint arrangement over switched or dedicated lines at speeds of 2400 to 19,200 bps in half-/full-duplex mode under BSC/SDLC protocols. ASCII characters are supported. Communication control rests with the IBM host terminal access methods. For the IBM S360/S370/3030/3081, and 4300, these include BTAM, BTAM-ES, TCAM, ACF/TCAM, VTAM, ACF/VTAM, ACF/VTAME, and EXTM. For a description of these access methods, see report 950-I048-3270.

☐ Distributed Configurations

The 9000 Series consists of 6 cluster controllers, a monochrome and a 7-color terminal, 7 matrix character printers, 2 line printers, and a terminal multiplexer. The number of attachable terminals and printers varies with the cluster controller, but the largest configuration attainable is 32 terminals or printers in any combination. The only restriction is that at least one device must be a terminal.

Two controllers, Models 9410 and 9416, contain 8 and 16 terminal ports, respectively, and cannot be expanded. The other controllers can be expanded to 32 ports.

The terminal multiplexer contains 8 ports and connects up to 8 terminals/printers via a coaxial cable to a local host. This unit also cannot be expanded.

In addition to the 9000 Series terminals and printers, ITT Courier allows the peripherals offered with its 270 Series to also be connected to 94XX controllers.

☐ Distributed Utilities

The 9000 Series runs the same IBM utilities available to the 3270. These include the Display Exception Monitoring Facility, the Device Independent Display Operator Console Support, the Network Problem Determination Application; the Status Display Support, Interactive Instruction System, and the Service Level Reporter, Version 2. For a description of these utilities, see report 950-I048-3270.

ITT Courier's diagnostics capture and display all data sequences between the cluster controller and the host mainframe. For remote controllers, the data stream is comprised of line traffic to or from the controller. For local controllers, the channel traffic is shown. Captured data can be frozen on the display screen or printed if desired. All data is presented in hexadecimal code.

For program development and maintenance, users may invoke the Format Reveal mode whereby the format attribute bytes, spaces, and nulls not normally displayed are translated into hex values for visual examination. Format Reveal can be activated by any display terminal attached to the cluster controller.

■ SOFTWARE

The 9000 operates under the same applicable systems software as comparable IBM 3270 components. The following is a brief list of the Operating Systems, Data Management, Communications/Networks, and Applications Development Aids software that can

 ©**1984 Data Decisions**

ITT Courier 9000 Series
Information Display System

be used by the 9000. For a detailed description of this software, see report 950-I048-3270.

☐ Operating System

The 9000 operates under OS, DOS, OS/VS1, OS/VS2(SVS), OS/VS2(MVS, MVS/SE, MVS/SP), DOS/VS, and DOS/VSE. It also runs under the Time Sharing Option (TSO).

☐ Data Management

Applicable data management software includes the advanced Text Management System II (ATMS-II), Airline Control Program (ACP), Customer Information Control System (CICS/VS), and Storage and Information Retrieval System (STAIRS/VS), and Information Management System (IMS and IMS/VS). See report 950-I048-3270.

☐ Communications/Networks

Communications access methods include ACF/VTAM and ACF/TCAM. In addition, the controllers can take advantage of the facilities offered by ACF/NCP, the Network Communications Control Facility (NCCF), and the Network Problem Determination Application (NPDA). See report 950-I048-3270.

☐ Applications Development Aids

There are a host of application development aids available for the IBM 3270 that will also run on the ITT Courier 9000. For example, the Display Management System (DMS/VS), Generalized Information System (GIS/VS), Structured Program Facility (SPF), Interactive System Productivity (ISPF), Virtual Storage Personal Computing (VSPC), and Graphical Data Display Manager & Presentation Graphics Feature (GDDM & PGF) all run on the 9000. See report 950-I048-3270.

■ HARDWARE

☐ Terms & Support

Terms • available for purchase or on a 2/3/5-year lease • leased units include maintenance • quantity discounts available.

Support • on-site service by vendor personnel available in 2 plans called Platinum and Gold • mail-in/carry-in service called Silver Plan • Platinum Plan calls for complete maintenance on a scheduled basis; system problems reported to regional service centers and a field engineer is dispatched • Gold Plan provides same level of service, except engineer calls on a prearranged schedule or after a certain number of elements require service • Silver Plan calls for the mail-in/carry-in of failed components; repaired units are returned to customer site or to regional carry-in centers.

☐ Packaged Components/Overview

The 9000 Series is a family of cluster terminal systems that emulate the IBM 3270 Information Display System operating with the characteristics and features of an IBM 3274 control unit (cluster controller) with attached 3178, 3179, 3180, 3278 Models 2 through 5, and 3279 Models S2A and S3G. The printers consist of several matrix and 2 line printers that replace the IBM 3287, 3268, and 3262. Personal computer support is provided by ITT Courier's new XTRA, a unit with facilities similar to the IBM PC/XT, or customers may attach the IBM PC to any of the cluster controllers.

The cluster controllers themselves consist of 4 remotely and 2 locally attached units. The remote units are Models 9410, 9416, 9420, and 9422, all of which emulate the 3274C models. The 9410 and 9420 support 8 to 16 ports, respectively; the 9416 and 9422 also support 8 or 16 ports, but provide redundant control logic and power supplies.

The local controllers are the 9440 and 9442, both of which are IBM 3274A Series replacements. The 9440 accommodates between 11 and 32 replacements. The 9440 accommodates between 11 and 32 terminals/printers; the 9442 is a 9440 with redundant control logic and power supplies.

Like IBM, the 9000 Series allows any combination of terminals/printers up to the physical limit. The only restriction is that at least 1 device must be a terminal. User-specified configurations are software defined, with the user specifying devices and their assignments from the keyboard. All configurations are held on a diskette integrated into the cluster controller.

Configuring the system involves selecting options and features that modify systems software, enabling and disabling display stations and printers, and defining operating modes for stations and printers. Configurations are held on a systems diskette and loaded into the controller upon operator command.

The local controllers attach to the local host via (selector, byte, or block multiplexer) channels. The remote controllers communicate half-/full-duplex over point-to-point/multipoint switched or dedicated lines at speeds from 2400 to 9600 bps for BSC operation, and 2400 to 19,200 bps for SDLC. An RS-232C interface connects the controller to the modem. An X.25 interface is optional on all controllers.

☐ Controllers

The controllers consist of a family of locally attached (to the host processor) and remotely attached units that interface with IBM 3704/3705/3725 front-end processors. The remote controllers are comparable to the IBM 3274C Series, and support SNA/SDLC, BSC, and CCITT X.25 protocols. Both point-to-point and multipoint configurations are permitted.

The local controllers are replacements for the 3274A series, and attach to the byte/block multiplexer and selector channels on an IBM System/360 and 370, 30XX, and 43XX host. The protocol is SNA/SDLC.

The remote controllers consist of Models 9410, 9416, 9420, and 9422. The 9410 and 9416 are targeted at smaller installations, and offer an 8-port and 16-port capacity, respectively. The 9420 consists of an 11-port unit that can be field upgradable to 32 ports in 7-port increments. The 9422 is essentially a 9240 with redundant control logic and power supplies.

The local controllers are Models 9440 and 9442. Both units support a minimum of 11 ports and can be field upgraded to 32 ports in 7-port increments, just like the 9420. The 9422 (like the 9422) is a 9440 with redundant control logic and power supplies.

All controllers support all of the 9000 Series terminals and printers described in this report. In addition, they also accommodate the following ITT Courier C270 devices: 2700-1X display terminals; 2790-2A color terminals; 1700 display terminals; 1900 color terminals; all C270 printers; and the 7570 personal computer interface. The latter allows an IBM Personal Computer (or equivalent) to be attached to the controller.

For those that need more local processing power, ITT Courier offers an IBM PC/XT equivalent called the XTRA Personal Computer. The XTRA is a 16-bit machine with 128K-byte RAM, 32K-byte ROM, and a 360K-byte diskette drive. The main memory can be expanded to 640K bytes and an integrated 10M-byte Winchester is also available. The XTRA connects to all ITT Courier 9000 Series controllers.

Model 94XX Remote Cluster Controllers

Four tabletop and floor-console controllers supporting 8 to 32 terminals or printers; device expansion adapter accommodates 7 terminals/printers • half-/full-duplex communication with IBM S/360, S/370, 43XX, and 30XX via 3705/3725 Communications Processor at speeds of 1200 to 19.2K bps under SNA/SDLC and 9600 bps under BSC; X.25 interface optional • single high-speed link • RS-232C interface.

Model 9410 • 8-port controller; nonexpandable BSC and SDLC protocols:

	$4,400 prch	$25 maint

Model 9416 • 16-port controller; nonexpandable • BSC and

PRCH: purchase price. MAINT: monthly maintenance fee. NA: not applicable/available. All prices single quantity. Prices effective as of October 1984.

 ©1984 Data Decisions

ITT Courier 9000 Series
Information Display System

SDLC protocols:

5,100	40

Model 9420 • 11-port controller; expandable to 32 ports • BSC and SDLC protocols:

5,700	29

Model 9422 • 11-port controller; expandable to 32 ports • includes redundant control logic and power supplies • BSC and SDLC protocols:

10,950	34

Model 944X Local Cluster Controllers

Two floor-console controllers supporting 11 to 32 terminals or printers; device expansion adapter accommodates 7 terminals/printers • attaches to byte/block multiplexer and selector channel to local host S/360, S/370, and 30XX; connects to 43XX via byte or block multiplexer.

Model 9440 • 11-port controller; expandable to 32 ports • local SNA protocol:

$10,700 prch	$43 maint

Model 9442 • 11-port controller; expandable to 32 ports • includes redundant control logic and power supplies • local SNA protocol:

21,200	49

Device Adapter • provides 7 ports for attachment of terminals/printers to cluster controllers:

2,400	5

7570 Personal Computer Attachment • connects IBM Personal Computer (or equivalent) to cluster controllers:

825	3

☐ I/O Channels

Models 9410, 9416, 9420 & 9422 Remote Processor Attachment

Controllers communicate with the host processor via switched or dedicated facilities and host channel-connected control units/adapters. On the S/360, 370, 3030, and 4300 processors, communication facilities connect via 2701 Data Adapter Unit, 2703 Transmission Control, or 3704/3705 communication controllers. On the S/370 Models 115, 125, 135, and 138, connection is via an Integrated Communications Adapter; the Communications Adapter is used on the 4331.

Models 9440 & 9442 Local Processor Attachment

Controllers directly connect to a local host via processor channels. From 8 to 32 BSC/SDLC terminals in 7-terminal increments can be attached. No more than 32 terminals or 31 printers are permitted. Controllers attach to an S/360, 370/115 through 370/168, 3031, 3032, 3033, and 3081 processors via a byte, selector, or block-multiplexer channel. Any 4300 processor attaches via a block or byte multiplexer. A microprocessor-controlled channel adapter handles data transfers and provides diagnostics.

Terminal-/Printer-to-Controller Attachment

Display terminals/printers attach directly at cluster controllers to device adapters; each adapter handles 7 printers/terminals. Up to 32 terminals/printers are accommodated and attach via coaxial cable. Terminals/printers can be located up to 5,000 feet from controller. For extended distance, the vendor offers an Extended Terminal Multiplexer (ETM) that interfaces up to 8 terminals and printers over a single coaxial cable with the cluster controller. Terminals and printers can be located up to 5,000 feet from the ETM.

Extended Terminal Multiplexer • provides 8 ports for connecting terminals/printers over a single coaxial cable to cluster controllers:

$2,750 prch	NA maint

Attached Printer Adapter • interfaces Model 9302 matrix printer to Model 9230 and 9236 terminals:

725	NA

X.25 Interface • interface facility allows 94XX controllers to connect to X.25 public data networks:

2,300	NA

☐ Communications

All remote controllers support BSC or SNA/SDLC communication protocols, and communicate with a host processor via half-/full-duplex transmission. Facilities can be leased or dial-up, point-to-point, or multipoint. Data transmission speeds are 2400 to 19,200 bps for SNA/SDLC devices, and 2400 to 9600 bps for BSC. An RS-232C interface connects the controller to the modem. All transmission is block mode. X.25 is offered as an option.

Diagnostics consist of a capture mode facility for lcoal and remote controllers. When activated, it functions as a monitor to capture and display all data sequences between the terminal controller and the mainframe. For remote terminal controllers, this data stream is comprised of the line traffic to and from the controller. For local terminal controllers, the channel traffic is shown. For more information, see Distributed Utilities.

☐ Diskette

Like most 3270-compatible products, the 9000 Series employs a diskette to store system configurations, tables, utilities, and support software. Users can modify the contents from the control terminal keyboard, and they may also create duplicate copies of the configuration or develop multiple configurations as processing needs dictate. The diskette cannot be used to store local applications, however.

☐ Workstations/Terminals

ITT Courier provides an extensive lineup of monocromatic terminals and color display for use with a family of cluster controllers. For the most part, the ITT displays duplicate the functions of the IBM Models 3178, 3179, 3180, 3278, and 3279.

Personal computer capabilities are provided by the ITT Courier XTRA that can connect to all 9000 Series controllers, or users can connect an IBM PC via a 7570 Personal Computer attachment.

The 9000 Series terminals consists of Models 1900, 9230, 9236, and the XTRA personal computer. Model 1900 is a compact color display equivalent to the IBM 3179. Like its counterpart, the 1900 displays 7 colors and has a 1920-character display capacity. It is available with a standard typewriter, typewriter/text, data entry, and typewriter/APL keyboards. The 1900 is priced slightly lower at $2,100 versus $2,295, and the keyboard costs an additional $250. IBM keyboards range between $460 to $630 for comparable arrangements.

The 9230 is a monochrome display with display characteristics equivalent to the IBM 3180 Model 1 and 3278 Models 2 through 5. Unlike its IBM counterparts, however, the 9230 can directly attach a Model 9302 matrix printer. On the negative side, the 9230 does not permit scrolling and has no local page storage, both of which are standard in the IBM 3180. The price position of the 9230 is more in line with the 3180: $2,180 versus $2,295 for IBM. Both terminals also include the keyboard as standard.

The 9236 color display computer with the IBM 3179 and 3279 Models S2B and S3G. All display 7 colors and have a 1920-character display capacity. The 9236, however, can also display 2560 characters, which the 3179 and 3279-S2B cannot do. To attain this extended display characteristic, the 3279-S3G must be used. The 9236 contains a keyboard as standard equipment, and can attach a printer directly. IBM charges extra for the printer and cannot attach a printer. The price of the 9236 is $3,600. The 3179, 3279 S2B and S3G are priced at $2,295, $3,490, and $5,190, respectively, plus keyboard.

The ITT Courier XTRA personal computer is operationally compatible with the IBM PC/XT and interfaces with all of the 9000 Series cluster controllers. XTRA employs an Intel 8088 16-bit microprocessor with 128K bytes of RAM (expandable to 640K) and a 360K-byte diskette drive. An integrated 10M-byte Winchester disk drive is optional. The ITT Courier DOS 2.11 operating system is employed. Full prices for XTRA are not yet available, but a unit with 256K RAM, 2 diskette drives, a

 ©**1984 Data Decisions**

ITT Courier 9000 Series
Information Display System

serial/parallel interface, monitor and operating system costs $2,995 for the monochrome version and $3,425 for color.

ITT Courier has a number of enhancements for the terminals scheduled for next year. These include a light pen, bar code reader, optical character reader, and magnetic slot reader for the terminals; plus auto-logoff/poweroff, entry assist to allow the terminals to perform word processing and file formatting, and auto-blank (blanks the screen after 10 minutes of inactivity). Also scheduled for 1985 is an interface for the Model 1900 to attach a matrix printer.

In addition to the 9000 Series terminals, user may also employ those offered with ITT Courier's 270 Series. See report 950-I889-0270 for details on those products.

Model 9230 Display Terminal

Configuration o cluster display employed with 941X, 942X, and 944X controllers • modular (detached) keyboard standard • attaches optional matrix printer.

Display • tilt and swivel, 15-inch diagonal • user-selectable 1920/2560/3440/3564 characters in 24x80, 32x80, 43x80, and 27x132 columns/rows format, plus status line • 7x8 dot matrix for 3440/3564 character format; 7x10 dot matrix for others • 96 ASCII/EBCDIC character set; APL character set • customer character sets • blink and nonblink cursor.

Edit & Format • cursor up, down, left, right, home, new line • tab, backtab, backspace • variable field underline; blinking fields • row and column indicator • cursor address write • erase EOF; clear input, clear screen • character insert/delete • protected and numeric only fields • reverse video and nondisplay attributes.

Communications • via cluster controller; see Controllers section for details.

Peripherals • directly attached matrix printer or cluster-controlled printer.

Keyboards • choice of typewriter-style, data entry, typewriter/text or typewriter/APL; see Keyboards/Keypads • optional numeric keypad, 24 program function keypad and attribute-select keypads available:

$2,180 prch	$10 maint

Model 1900 Color Display Terminal

Configuration • clustered display employed with ITT Courier 94XX and C270 cluster controllers; keyboard optional.

Display • tilt and swivel, 14-inch diagonal • 7x8 matrix • 1920-character, 24-line x 80-character format plus 25th status line • 96 EBCDIC or ASCII; EBCDIC/APL character sets • custom character sets • 7-color presentations (white, red, blue, green, pink, yellow, and turquoise) • blink and nonblink cursor.

Edit & Format • cursor up, down, left, right, home, new line • tab, backtab, backspace key functions • cursor address write • erase EOF; clear input, clear screen • character insert and delete • protected and numeric-only fields • blink, intensity, reverse video, underscore, and attributes.

Communications • via cluster controller; see Controller section for details.

Peripherals • cluster printers via controller.

Keyboards • typewriter, data entry, typewriter/text, and typewriter/APL; see Keyboards/Keypads • optional numeric keypad, 24 program function keypad, and attribute-select keypads available:

$1,900 prch	NA maint

Model 9236 Color Display Terminal

Configuration • cluster display employed with 941X/942X/944X controllers • detached keyboard standard • attaches optional matrix printer.

Display • tilt and swivel, 14-inch diagonal • user-selectable 1920/2560 characters in 24x80 or 32x80 columns/rows format plus status line • 7x8 dot matrix • 96 EBCDIC or ASCII; APL character set • 7-color presentation (white, red, blue, green, pink, yellow, and turquoise) • blink and nonblink block and underscore cursor.

Edit & Format • cursor up, down, left, right, home, new line • tab, backtab, backspace • variable field underline; blinking fields • row and column indicator • cursor address write • erase EOF; clear input, clear screen • character insert/delete • protected and numeric only fields • reverse video and nondisplay attributes.

Communications • via cluster controller; see controllers section for details.

Peripherals • directly attached matrix printer or cluster-controlled printer.

Keyboards • choice of typewriter-style, data entry, typewriter/text, or typewriter/APL; see Keyboards/Keypads • optional numeric keypad, 24 program function keypad and attribute-select keypads available:

$3,600 prch	$14 maint

XTRA Personal Computer

Configuration • personal computer with monochrome display, 16-bit Intel 8088 microprocessor, 128K bytes of RAM, 32K bytes of ROM, 360K bytes of diskette storage, 5 IBM bus-compatible expansion slots, controller for 4 diskette drives, 1 serial (RS-232C) and 1 parallel interface, socket for additional 128K-byte RAM, ITT Courier DOS 2.11 operating system, and 84-key typewriter layout keyboard with 10 programmable function keys, 10-key numeric keypad, 5 editing keys, and RS-232C interface • connects to all ITT Courier local and remote cluster controllers.

Display • tilt and swivel, 14-inch diagonal • 7x9 matrix • 1920 characters formatted 24 lines x 80 characters; 25th status line.

XTRA Monochrome • all of the above standard features plus 128K RAM expansion:

$2,995 prch	NA maint

XTRA Color • all of the above standard features plus 12-inch diagonal CRT displaying 7 colors, 640x200 high-resolution graphics, 320x200 medium-resolution graphics, and 128K RAM expansion:

3,425	NA

10M-Byte Winchester Disk • internal half-height 10M-byte disk drive • field-upgrade option:

2,390	NA

128K RAM Upgrade • provides up to 640K bytes of RAM expansion in 128K increments:

NA	NA

Mouse • provides control pointer for menu-selecting system options:

NA	NA

☐ Keyboards/Keypads

ITT Models 1900, 9230, and 9236 include a choice of typewriter-style, data entry, typewriter/text, or typewriter/APL keyboards as standard equipment. All feature 12 program function keys, shiftable to provide 24 programmable functions; and cursor control keys.

The keyboards can also be modified to provide variant functions, such as a Dual Logical Unit key that accesses either 1 of 2 concurrent active sessions; a Note Pad key that allows users to store online reminders; and a Reveal Mode key that allows programmers to view all field attributes. Each keyboard has a 5- or 11.5-degree adjustment.

Separate keypads are also available to enhance or expand standard keyboard functions. Each keypad measures 2.2 (H) x 4.25 (W) x 9 (D) inches. The height adjustment is also 5 or 11.5 inches.

In addition to the 4 standard keyboards described below, the vendor offers several variants. These include a typewriter-style with 18-key numeric pad; a typewriter-style with 24 program function keys arranged in a calculator format; a data entry-style with 18-key numeric pad; and a data entry-style with 24 program

 ©1984 Data Decisions

ITT Courier 9000 Series
Information Display System

function keys arranged in a calculator format. No prices were available at this writing for the variant keyboards.

Typewriter Keyboard • 92-key standard typewriter layout with 12 program function keys, shiftable to provide 24 programmable functions:

$250 prch	$2 maint

Data Entry Keyboard • 92-key nonkeypunch layout • alphabetic keys in typewriter arrangement; numeric keys in keypunch arrangement; 12 program function keys:

250	2

Typewriter/Text Keyboard • 92-key typewriter layout incorporating 65 text-specific characters • text functions activated by pressing TEXT ON/OFF key • 12 program function keys shiftable to 24 programmable functions:

250	2

Typewriter/APL Keyboard • 92-key typewriter layout incorporating 81 specific APL characters • APL functions activated by pressing APL ON/OFF key • 12 program function keys shiftable to 24 programmable functions:

250	2

Numeric Keypad • 18-key numeric and control keys arranged in calculator format • tab, ENTER, and erase end-of-field keys:

150	1

Program Function Keypad • 18-key calculator arrangement • 12 program function keys with shift-actuated capacity to provide 24 programmable functions:

150	1

Attribute Select Keypad • 18-key calculator layout • provides separate keys for entering extended character highlighting, color attributes, programmed symbol sets, or restore attribute functions:

150	1

☐ Printers

ITT Courier supports the 9000 Series with an extensive lineup of serial matrix and high-speed impact line printers. The matrix printers are offered in color and noncolor versions, and interface with the host via 941X, 942X, and 944X cluster controllers. The printers operate in Data Stream Compatible (DSC) or SNA Character String (SCS) modes. All matrix printers have customer-replaceable printheads, diagnostics to isolate printhead failure from logic problems, cut-sheet and continuous forms handling, demand document capability, and optional automatic sheet and envelope feeder. The printers consist of Models 9301, 9302, and 9303, which are IBM 3287-1 equivalents, and Models 9304, 9305, 9306, and 9308, which are IBM 3268 and 3268C replacements.

The line printers also attach to the 941X, 942X, and 944X cluster controllers and support DSC and SCS modes. Both printers employ print bands and are offered in a variety of character sets. Bands are operator interchangeable. The Model 9341 can be upgraded to a Model 9342. Both are IBM 3262-3/-13 replacements.

Model 93XX Matrix Printers

Configuration • tabletop serial matrix impact printers • 132 columns; 10/12/13.3/15/16.67 cpi • 3/4/6/8 lpi • 7x8 dot-matrix draft mode; 15x16 dot-matrix Near Letter Quality (NLQ) mode • bidirectional logic-seeking printing • horizontal and vertical tabs • prints original and 6 copies • SCS and DSC print compatibility • 272 APL/Text character set.

Model 9301 • 120-cps draft mode; 55-cps NLQ:

$4,400 prch	$44 maint

Model 9302 • 150 cps; 10 or 16.6 cpi:

725	NA

Model 9303 • 200-cps draft mode; 55-cps NLQ:

5,100	50

Model 9304 • 400-cps draft mode; 100-cps NLQ:

6,600	60

Model 9305 • 4- and 7-color printer • 200-cps draft mode (monochrome); 100-cps NLQ (4- and 7-color printing):

5,700	60

Model 9306 • 4- and 7-color printer • 400-cps draft mode (monochrome); 100-cps NLQ (4- and 7-color printing):

8,100	80

Model 9308 • 120 cps; 6 and 8 lpi; 10 or 16.6 cpi:

2,500	NA

Model 934X Line Printers

Configuration • floor-console impact print band printer • 132 columns; 3/4/6/8 lpi • 127 lines per page • upper-/lowercase or uppercase only • DSC and SCS print compatibility • 48/64/96/128 ASCII character sets • original and 6 copies; maximum form length of 127 lines.

Model 9341 • 250/300/370 lpm with 96/64/48 character sets:

$11,350 prch	$125 maint

Model 9342 • 460/600/720 lpm with 96/64/48 character sets:

13,550	175

• END

©1984 Data Decisions